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NRL Memorandum Report 3543

ELF Nonlinear Noise Processing Experimental Measurements

Part 3—Synoptic Sample of Diurnal and Seasonal Noise Variation in Italy

JOSEPH A. GOLDSTEIN, WILLIAM D. MEYERS and JOHN R. DAVIS

Telecommunication Systems Technology Branch
Communications Sciences Division

July 1977

NAVAL RESEARCH LABORATORY
Washington, D.C.

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NRL Memorandum Report 3543	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) ELF NONLINEAR NOISE PROCESSING EXPERIMENTAL MEASUREMENTS, PART 3 — SYNOPTIC SAMPLE OF DIURNAL AND SEASONAL NOISE VARIATION IN ITALY		5. TYPE OF REPORT & PERIOD COVERED Interim report on a continuing NRL problem. 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Joseph Goldstein, William D. Meyers and John R. Davis		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Research Laboratory Washington, D.C. 20375		10. PROGRAM ELEMENT PROJECT, TASK AREA & WORK UNIT NUMBERS NRL Problem R07-23 Project RF21-222
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Electronic Systems Command Washington, D.C. 20360		12. REPORT DATE July 1977 13. NUMBER OF PAGES 26
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Using a suitable nonlinearity in the input stage of an extremely low frequency receiver can improve received signal-to-noise ratio (SNR) by whitening the nongaussian atmospheric noise at these frequencies. Previous studies indicate that performance of simple clippers, carefully adjusted on the basis of the raw noise amplitude statistics, is very nearly equal to that of the optimum clipper.

A collection of ELF noise data for the summer, fall and spring seasons and nearly all times of day has been acquired at a receiving site near Pisa, Italy. These data have been used to evaluate the

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20. Abstract (Continued)

improvement in SNR that can be expected from simple clipping under a variety of noise and propagation conditions.

Under both quiet and noisy conditions little performance difference is observed among processing channels with clipping levels as far apart as 6 to 18 dB, in the vicinity of the optimum clipping level.

The nonlinear processing method described in this report provides at least 6 dB of SNR improvement over the performance obtained without suitable processing.

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ELF NONLINEAR NOISE PROCESSING EXPERIMENTAL MEASUREMENTS

PART 3 -- SYNOPTIC SAMPLE OF DIURNAL AND SEASONAL NOISE VARIATION IN ITALY

INTRODUCTION

The amplitude probability distribution (APD) of extremely low frequency (ELF) atmospheric noise is highly nongaussian because of the impulsive noise from local thunderstorms. In the study by Ginsberg [1], it is shown that the APD of ELF noise exhibits approximate log-normal behavior between the 10% and 90% exceedence levels at locations removed from major thunderstorm centers, and that during periods of local thunderstorm activity the APD contains an enhanced amplitude above the 10% exceedence level*. Ginsberg suggests that a 10 dB or greater improvement in signal-to-noise ratio (SNR) can be accomplished by removing the high amplitude tail from the atmospheric noise APD.

A technique to excise the high-amplitude tail has been investigated by Davis and Meyers ([2] and [3]), in which a controlled non-linearity is placed in the communications receiver at a point of wide signal-plus-noise bandwidth. Evans and Griffths [4] have investigated the form of the optimum nonlinearity, and find that near-optimum performance can be achieved by employing a simple clipper that is adjusted adaptively to limit between 10% and 40% of the time.

The purpose of this report is to examine the performance of an ELF noise processing technique that employs wideband clipping on data collected in the actual noise environment in which an ELF communications receiver will be expected to operate. Davis and Meyers ([2] and [3]) have reported the results of wideband clipping to excise ELF atmospheric noise for data recorded in Tromsø, Norway; this report is concerned with similar data collected in Pisa, Italy and demonstrates the improvement in SNR to be expected in the Mediterranean Sea area from nonlinear processing. Data were collected for three one-month periods during 1975 and 1976 that comprise the spring, summer and fall seasons.

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* The 10% exceedence level is the amplitude which is exceeded by less than 10% of the samples.

Note: Manuscript submitted June 16, 1977.

Below, we give a brief description of the data collection and processing system, examples of processed noise data, and the conclusions of the study. The nonlinear processing described in this report provides 6 to 12 dB improvement in SNR over performance obtained without suitable processing. The diurnal variation and seasonal dependence of the nonlinear processed noise averaged over a time span of several weeks are predictable and reliable functions of the solar season. Therefore, good nonlinear noise processor performance can be achieved by employing a manually adjusted, one- or two-channel signal processor whose clipping levels can be set on the basis of seasonal mean noise level predictions.

DATA COLLECTION AND PROCESSING

The magnetic field (H-field) component of the atmospheric noise was measured by an air-core loop antenna coupled to a simple receiver that contained both preamplifier and post-amplifier stages. Power line frequency components were removed by notch filters inserted between the two amplifier stages. The amplifier stages incorporated bandpass filtering that produced an overall system bandwidth of 2 to 130 Hz. The filtered noise was recorded on an analog instrumentation tape recorder. An extremely stable 76 Hz calibration signal, whose amplitude was set to fall below the likely deepest clipping level, was inserted into the receiver at all times. For a more detailed discussion of the receiving system the reader is referred to Davis and Meyers ([2], [3]) and Meyers and Davis [5].

Figure 1 is a block diagram of the signal processor. The analog tape recordings were played back through the processor and the outputs recorded on digital tape for subsequent computer analysis. The analog tape recorder ELF noise output was fed to six parallel clippers after notch filtering to eliminate power line frequency components. In addition to power line frequency notch filtering, a notch filter at about 110 Hz was incorporated to eliminate a locally-generated interfering signal of unknown origin at the Pisa site. The $Q = 1$ bandpass filter limited the processing bandwidth to the interval from 38 to 114 Hz. The clippers were adjusted from -147 to -117 dB relative to 1 A/m(dBA/m) in 6 dB increments. As shown in Fig. 1, the output of clipper 3 was used in a phase-locked loop to maintain phase coherence of the synchronous detectors. Thus the outputs of the detectors were all in-phase with each other; after being filtered by low pass filters with a 1 second time constant (resulting in digitized clipped noise that is normalized to a 1 Hz bandwidth), they were recorded on a digital recorder. The normalization to a 1 Hz bandwidth converted the data to an effective noise spectral density that can be expressed in dB relative to 1 $A/m/(Hz)^{\frac{1}{2}}$ (dBH).

The subsequent processing involved computation of a quantity termed "effective noise," which is defined by Bernstein, *et al.* [6]. The wideband clipping processor affects both the signal and the noise;

therefore, the SNR is not linearly related to the unprocessed noise power spectral density. "Effective noise" power is defined as the ratio of the known power spectral density of the injected calibration signal to the post-processing SNR. The post-processing SNR was determined by computing the ratio between the meansquare calibration signal amplitude and its variance after an effective 13 minutes of coherent integration. The computer data reduction provides the following results:

- effective noise spectral density for five of the six clipper channels for each 13 minute integration period;
- the minimum effective noise spectral density (MENSD) for each 13 minute integration period;
- the MENSD for each recording period (approximately 15 hours), determined by calculating the RMS value of all the 13 minute MENSD values;
- the standard deviation of the MENSD for each recording period; and
- the cumulative APD of the MENSD for each recording period.

DATA ANALYSIS AND DISCUSSION

The data presented in this report were recorded for three one-month periods at a location near Pisa, Italy (Lat. 44°N, Long. 10°E). Figure 2 represents the data from July/August 1975. This figure is a scatter plot of the hourly samples of the MENSD. This representation of the data illustrates the diurnal variation of the data and the day-to-day variability of the noise. Included in this plot are two lines that trace out the hourly values of MENSD for the noisiest day (Julian day 223) and quietest day (Julian day 206) of the recording period. The RMS value of the MENSD for a full day's analog tape is used as the criterion to determine the noisiest and quietest days. In all cases, the noisiest and quietest days from the standpoint of effective noise coincided with the noisiest and quietest days from the standpoint of nominally unclipped noise.

There are several important aspects about the data of Fig. 2. The diurnal variation in the effective noise is very pronounced, with the quiet day varying about 7 dB and the noisy day varying about 14 dB. There is a general increase in the noise from the start of the recording period until about 14 UT. The quiet day noise then remains relatively stable in amplitude. The further increase, dip and then large increase in the noisy day's data is probably influenced by local thunderstorm activity, as evidenced by a thunderstorm-caused electric utility power failure at the receiver site shortly after 19 UT.

A complete time history of the effective noise levels is given in Tables 1 and 2 for the quiet and noisy days. These tables contain the individual 13 minute samples that comprise the data for that day's recording period. Table 1 tabulates 73 samples by Julian day number and Universal Time (UT) for the quiet day of the July/August 1975 data collection period. The six columns of data presented are the values in dBH of the RMS effective noise spectral density. Columns 1 to 5 represent five clipper levels spaced from -144 dB A/m (column 1) to -120 dB A/m (column 5) in 6 dB increments. The sixth clipper's noise level has not been displayed but has been replaced with the minimum of the six effective noise levels (the sixth clipper never produced the minimum value). The MENSD for each sample is enclosed in a box to permit convenient observation of the temporal variation of the best clipping level. Included at the bottom of the table are the daily mean effective noise level and its standard deviation for the five clipper levels and the minimum.

A comparison between the unclipped noise spectral density and the MENSD would show the improvement in SNR that can be expected from the nonlinear noise processing. Unfortunately, the linear dynamic range of the analog tape recorder used in the data collection is about 40 dB, resulting in some clipping of the highest amplitude noise spikes. Evans and Griffiths [3] have indicated that a receiving system would require a linear dynamic range of about 80 dB in order to insure unclipped recording of all of the noise spikes. In the subsequent discussion, we attempt to achieve an estimate of the improvement in SNR provided by the nonlinear processing by comparing the results with only slightly preclipped noise recorded on a narrow-bandwidth (1 Hz) channel.

The significant features of Table 1 are:

- The best clipper level varies fairly randomly between clippers 1-3.
- The effective noise level variation between clippers 1-3 is confined to 0.5 dB or less for almost all the samples.
- On the average the effective noise level difference between clippers 2 and 3 is less than that between clippers 1 and 2.
- The daily mean effective noise levels show that there is 0.1 dB or less separation between clippers 1-3 over the entire day's data and these values are within 0.3 dB of the minimum mean effective noise.

The tabulation of nonlinear processed noise for the noisy day is contained in Table 2. The best clip level for this day's data varies randomly between clippers 1-4 and even to clipper level 5 (-120 dBA) for one of the samples. The effective noise varies by 1 dB or less

between all five clipper levels from about 11:32 UT to 18:27 UT (with only a few exceptions). As in the case of the quiet day's data, the difference between clippers 2 and 3 is generally less than that between clippers 1 and 2. The daily mean effective noise for clippers 1-4 varies by 0.3 dB or less and is within 0.4 dB of providing the minimum mean effective noise.

Of the three seasons' data examined in this report, the highest amplitude noise occurs in the summer season because of greater local thunderstorm activity. Tables 1 and 2 indicate a wide choice of clipping level can provide equally good performance of the nonlinear noise processing technique. The indication is that when local thunderstorms give rise to many large amplitude noise spikes, large differences in clipping level have little effect on system performance. Davis and Meyers ([2] and [3]) noted this same effect.

Figure 3 shows the cumulative probability distribution for the summer minimum effective noise data, compared with noise measured simultaneously in a narrowband (1 Hz) recording channel without nonlinear wideband processing and averaged over a 1 hour period. The nonlinear processing provides 7 to 12 dB of improvement over conditions in which no prefiltering processing is attempted. As previously mentioned, the narrowband recordings are limited to 40 dB dynamic range and the frequency of large amplitude noise spikes is greatest in the summer season. Therefore, the narrowband noise is unavoidably clipped in the recording system by some unknown amount; this circumstance results in an underestimate of the unprocessed noise level.

Figure 4 contains the hourly samples of the MENSD for the data taken during October and November 1975. The diurnal variation is somewhat more pronounced than for the summer data, but the peak-to-peak amplitude variation of about 6 to 7 dB is smaller than the 10 dB typical of the summer data. There is a minimum at about 09 UT for both the noisy and quiet days. The noisy day's effective noise is generally more regular in appearance, whereas the quiet day displays a broad, irregular minimum between 02 and 09 UT. The separation between noisy and quiet day data is larger than for the summer data.

Tables 3 and 4 contain the time history for the effective noise levels for the fall's noisy and quiet days respectively for each of the five clipper levels. The clipper levels vary from -147 dB A/m (clipper 1) to -123 dB A/m (clipper 5). These settings are 3 dB lower than the summer data levels because of the lower noise level encountered in the fall season. The best clip level for both days' data varies between clipper levels 1 to 4 but shows a definite predominance for clipper 3 for most of the samples. The best clip level does not follow the diurnal variation in the minimum effective noise, possibly because of insufficient notch filtering of interfering cultural noise that was present in these data. However, the other features of the nonlinear processing are still readily discernible. For the noisy

day's data of Table 3 we find that a difference in performance of 0.4 dB or less exists between clippers 1-3 for most of the samples. Similar statistics exist for quiet day's data of Table 4. A difference in performance of 0.5 dB or less exists between clippers 1-4 for most of the samples. This small difference in performance is confirmed when the daily means are examined. For both the noisy and quiet days clippers 1-4 are within 0.6 dB of providing the lowest effective noise.

The cumulative probability distribution for the minimum effective noise data is shown in Fig. 5 along with narrowband (1 Hz) noise. The nonlinear processing provides 6 to 10 dB in improvement over the unprocessed data. We emphasize again that the limited dynamic range of the recording system unavoidably clips a portion of the narrowband noise, and hence this improvement is underestimated.

The hourly samples of MENSD for the data from March and April 1976 are contained in Fig. 6. The diurnal variation for these spring data is similar to that for the fall data: The peak-to-peak amplitude is about 6 to 7 dB, and the minimum in the effective noise occurs near 09 UT. The absence of a minimum for the summer (Fig. 2) is the result of increased thunderstorm activity during the summer season. Both the noisy and quiet days exhibit some irregular behavior. If these irregularities were removed, the two curves would present a smooth gradual decrease to the minimum at 09 UT and begin to rise again.

The time history for the spring's noisy and quiet days' effective noise is given in Tables 5 and 6. The clipper levels are the same as those for the fall data. The best clipper level varies between clippers 1-4 for both days and more or less follows the diurnal variation of the curves in Fig. 6. Table 5 for the quiet day's data shows that there is 0.4 dB or less difference in performance between clippers 1-4 for almost all of the samples. This small difference in performance is confirmed by noting that the daily means for clippers 1-4 are <u>ecual</u> and are only 0.3 dB away from providing the minimum daily mean effective noise. Table 6, for the noisy day shows a higher dependence of the effective noise on clipper level. There is 0.5 dB or less difference in performance between clippers 2 and 3 and between 3 and 4 for most of the samples. But between clippers 1 and 2 this level of performance exists for only about half of the samples. Nevertheless, clippers 1-4 provide performance that is within 0.5 dB or less of the minimum daily mean effective noise.

The cumulative probability distribution for the minimum effective noise is shown in Fig. 7 along with that for the narrowband (1 Hz) noise. The improvement provided by the nonlinear processing is 4 to 9 dB.

In order to compare the noise data for different seasons of the year, Fig. 8 contains the cumulative probability distribution for the minimum effective noise for the three seasons. The fall and spring

data are very similar and differ by at most 2 dB for all exceedence levels. The summer daytime noise is 6 to 7 dB higher than the spring/fall noise for all exceedence levels. This seasonal amplitude variation is very similar to that found by Davis and Meyers [3] for Norway noise, i.e., the spring noise was slightly higher than the fall noise, and summer noise was 6 to 7 dB higher than the spring noise. In general, the Norway noise is 2 to 3 dB lower than the Italy noise.

The daily minimum mean effective noise values in Norway and Italy are compared in Table 7. Except for the summer noise on the noisy day, for which the Norway value is slightly higher than the Italy value, the noise is 1.5 to 3.3 dB higher in Italy. This result is not surprising, since the Italy location is closer to the equatorial sources of intense thunderstorms.

CONCLUSIONS

Data presented in this report are for one month periods for the summer, fall, and spring seasons of the solar cycle. The data represent a comprehensive sampling of ELF noise conditions at mid-latitude for nearly all hours of the day.

Several important conclusions can be drawn:

- The greatest variation in MENSD from the noisiest-to-quietest-day occurs in the time from 06 to 10 UT or 22 to 02 UT. These times coincide with the movement of the sunrise-sunset terminator across the receiving site. This circumstance is consistent with the expected rapid ionospheric change that is associated with sunrise-sunset conditions.

- Under noisy or quiet conditions good nonlinear wideband noise processing can be achieved by employing a simple clipper. The amplitude setting of this clip level can span approximately 6 to 18 dB and provide the best level of performance nearly all of the time.

- Nonlinear noise processing of this type can provide at least 6 dB of improvement in SNR over processing that provides no pre-filtering of the noise under virtually all noise conditions. This 6 dB of improvement is an underestimate of the improvement due to the unavoidable clipping that took place in the narrowband recording system with which the clipped data are compared.

- The general tendency of the data is to confirm that both the diurnal variation and the seasonal dependence of MENSD, and the cumulative probability distribution of effective noise

spectral density averaged over several weeks time are predictable, reliable functions of the solar season.

These findings suggest that good nonlinear noise processor performance can be provided for the high-noise conditions that represent the communications systems performance limit by provision of a manually adjusted, one- or two-channel signal processor whose clipping levels can be set on the basis of seasonal mean noise level predictions. On the basis of the finding by Evans and Griffiths [4] that a properly adjusted clipper provides performance quite close to that of an optimal nonlinearity, we conclude that this relatively simple and inexpensive expedient can provide near-optimum performance for ELF communications systems operating in the environment of atmospheric noise.

Finally, we note that both in the case of the probable ELF signalling formats used in the noise-processing simulations by Evans and Griffths [4] and the simpler continuous wave reference signal format we used, the rather long coherent integration times necessary to achieve acceptable SNR resulted in matched filter outputs that obeyed a gaussian amplitude probability distribution whether or not nonlinear processing was employed. We believe the achievable improvements in SNR suggested by our findings may be translated accordingly to improvements in communications bit error rate.

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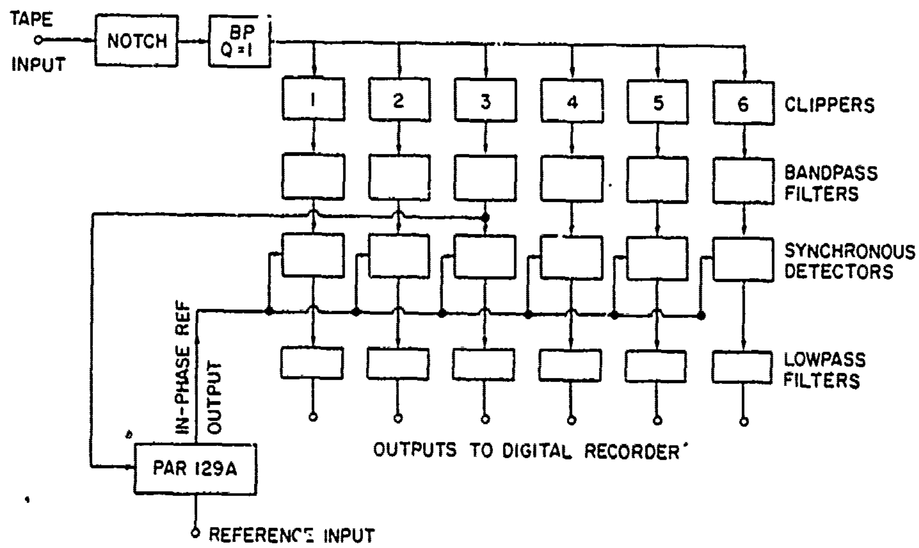

Fig. 1 — Functional block diagram of nonlinear noise processor

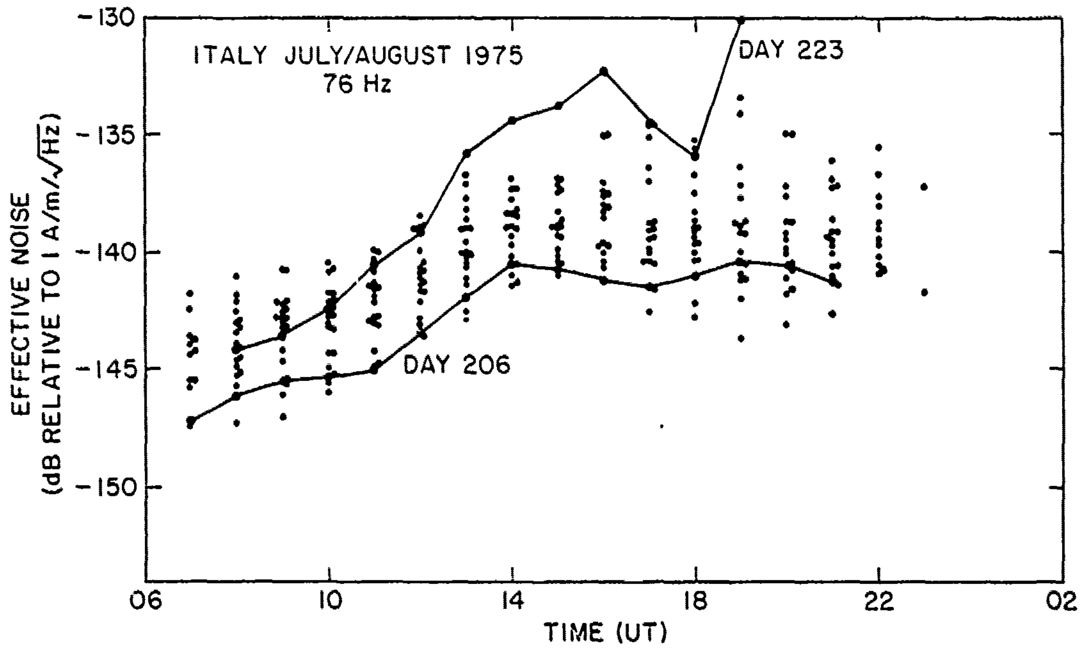

Fig. 2 — Hourly samples of minimum effective noise, each averaged over 13 min., July/August 1975

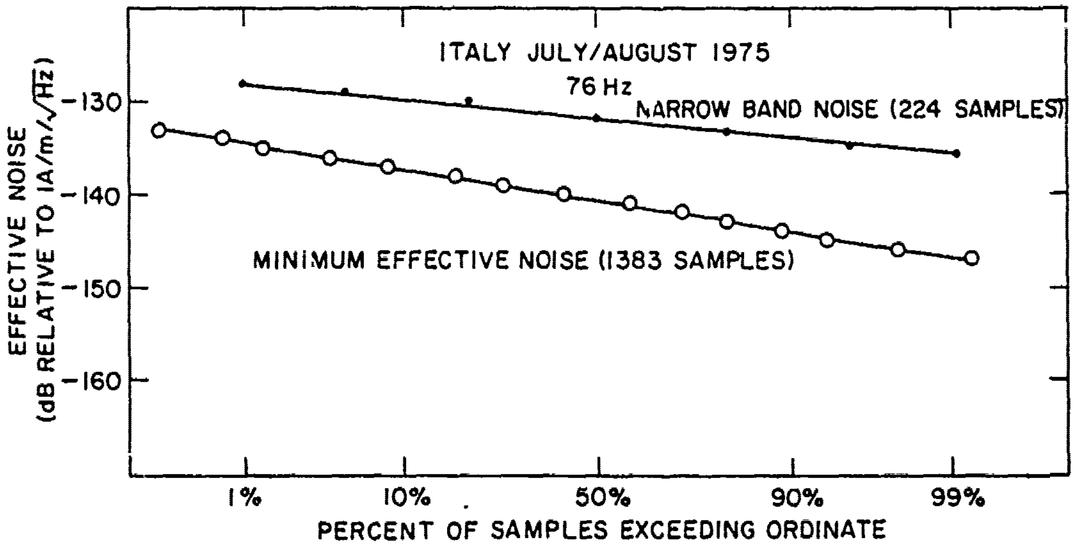

Fig. 3 — Cumulative probability distribution of minimum effective noise samples compared with narrowband noise for July/August 1975

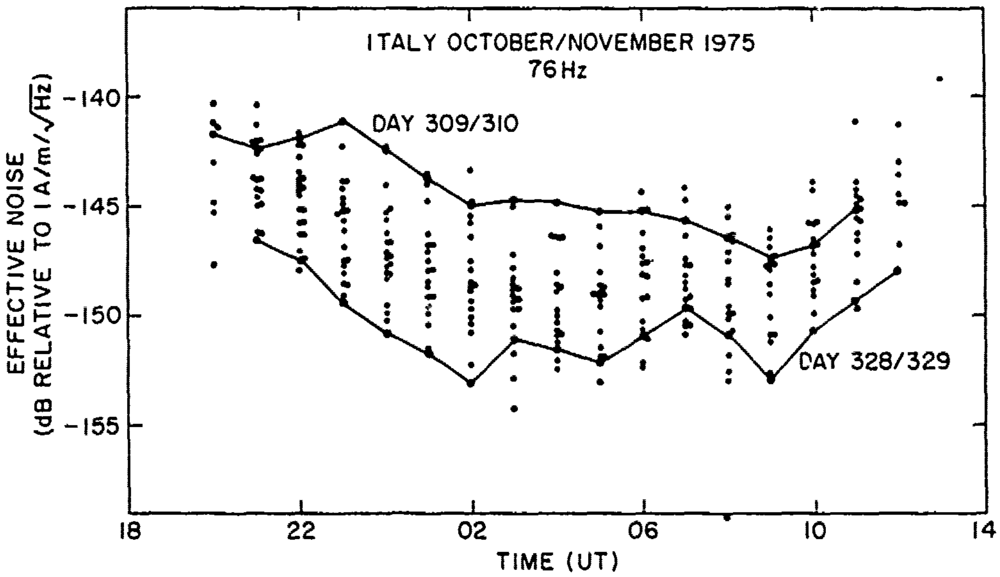

Fig. 4 — Hourly samples of minimum effective noise, each averaged over 13 min., October/November 1975

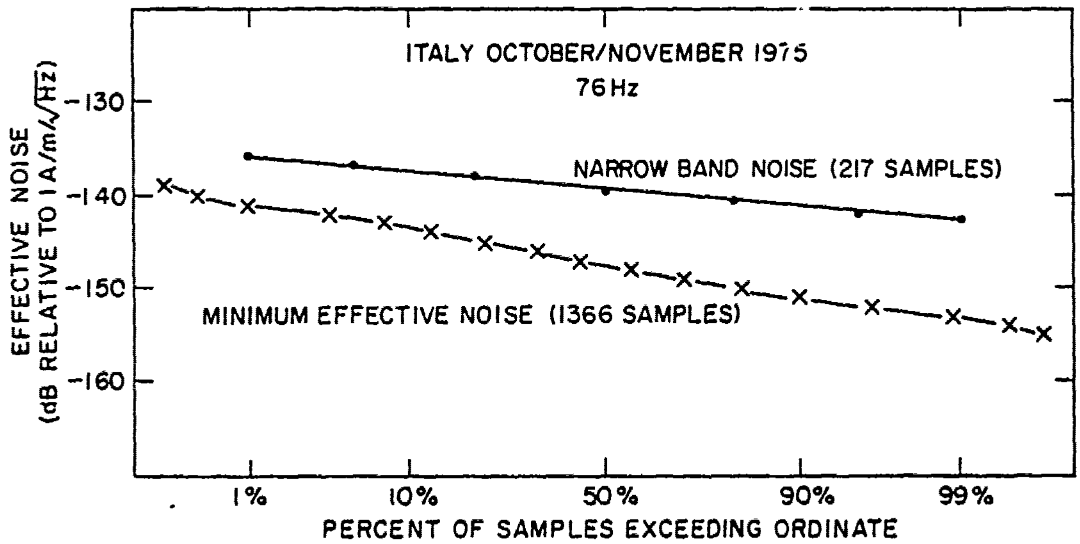

Fig. 5 — Cumulative probability distribution of minimum effective noise samples compared with narrowband noise for October/November 1975

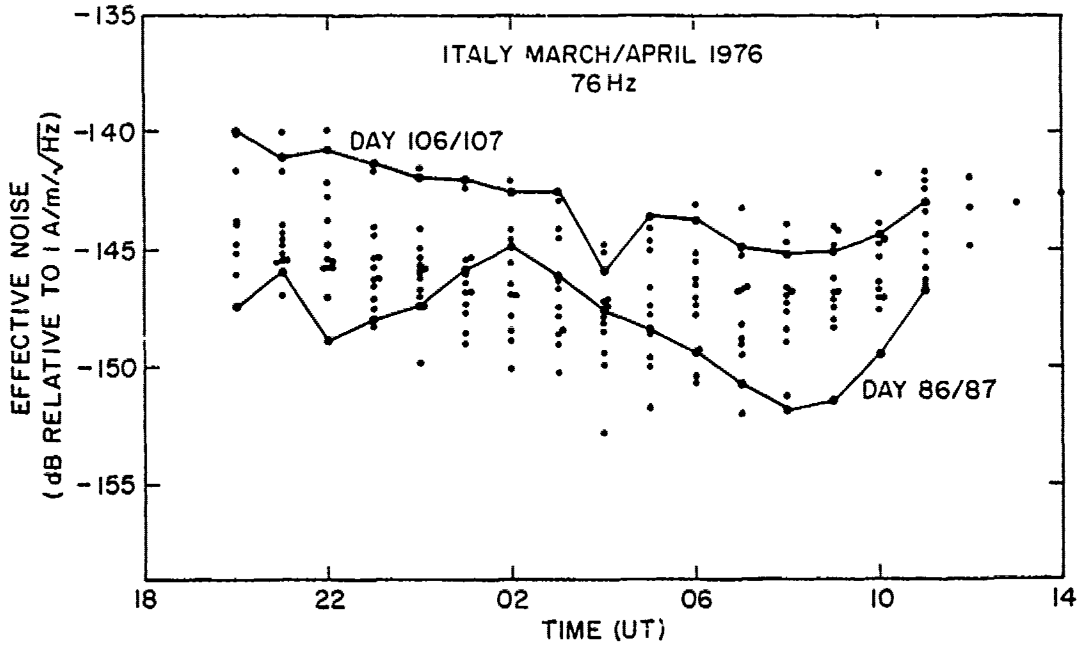

Fig. 6 — Hourly samples of minimum effective noise, each averaged over 13 min., March/April 1976

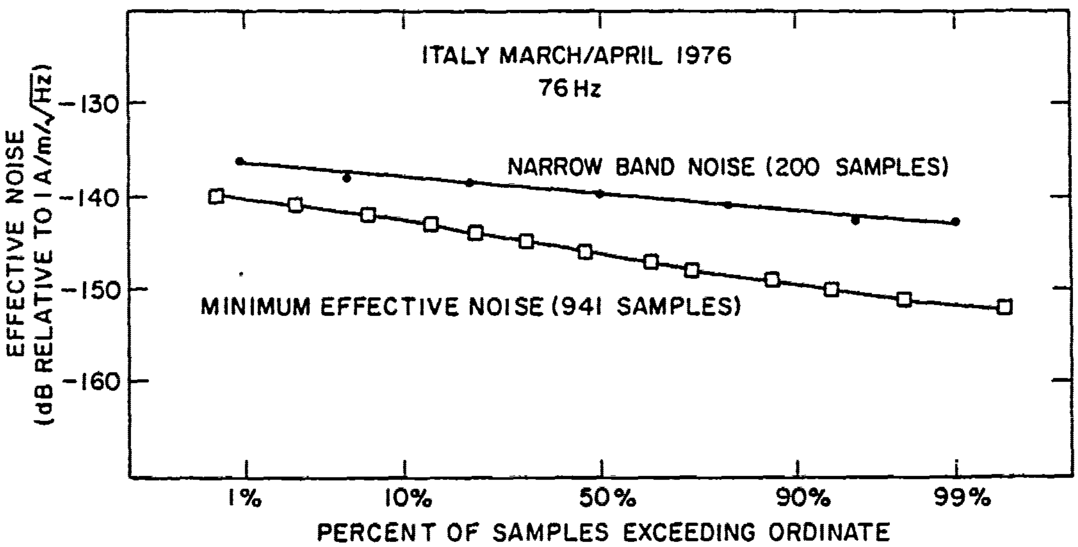

Fig. 7 — Cumulative probability distribution of minimum effective noise samples compared with narrowband noise for March/April 1976

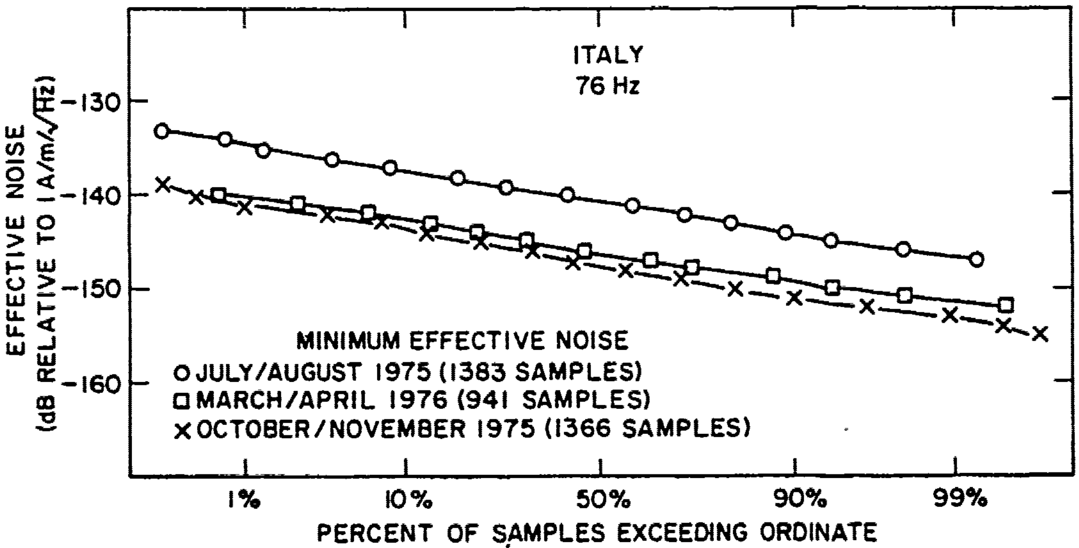

Fig. 8 — Cumulative probability distribution of minimum effective noise samples for the summer, fall and spring seasons

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Table 1

SAMPLE NUMBER	DAY NUMBER	UNIVERSAL TIME	EFFECTIVE NOISE LEVEL (DB RELATIVE TO 1A/m /√Hz) 1	2	3	4	5	MIN.
1	206	6:26: 0	-147.0	-147.0	-146.7	-145.8	-144.9	-147.0
2	206	6:38:58	-147.4	-147.5	-147.2	-146.1	-144.9	-147.5
3	206	6:51:56	-147.1	-147.0	-147.2	-146.0	-145.1	-147.2
4	206	7: 4:54	-146.7	-147.1	-147.2	-146.2	-145.2	-147.2
5	206	7:17:52	-146.4	-146.4	-146.3	-145.3	-144.4	-146.4
6	206	7:30:51	-146.7	-146.8	-146.9	-146.1	-144.8	-146.9
7	206	7:43:49	-146.4	-146.1	-146.1	-145.3	-144.4	-146.4
8	206	7:56:47	-146.2	-146.2	-146.0	-145.3	-144.5	-146.2
9	206	8: 9:45	-145.6	-145.8	-146.0	-144.9	-143.5	-146.0
10	206	8:22:44	-146.2	-146.1	-146.1	-145.3	-144.3	-146.2
11	206	8:35:42	-146.0	-145.8	-145.9	-144.9	-144.1	-146.0
12	206	8:48:40	-146.0	-146.2	-146.2	-145.3	-144.3	-146.2
13	206	9: 1:38	-145.6	-145.5	-145.2	-144.2	-143.3	-145.6
14	206	9:14:37	-145.3	-145.2	-144.9	-143.8	-142.9	-145.3
15	206	9:27:35	-144.6	-144.7	-144.8	-144.0	-143.1	-144.8
16	206	9:40:33	-145.3	-145.3	-145.0	-144.0	-143.2	-145.3
17	206	9:53:31	-145.3	-145.7	-145.3	-144.5	-143.6	-145.7
18	206	10: 6:30	-144.5	-145.0	-145.1	-144.3	-143.3	-145.1
19	206	10:19:28	-145.4	-145.3	-145.1	-144.3	-143.1	-145.4
20	206	10:32:26	-145.2	-145.2	-145.3	-144.3	-143.4	-145.3
21	206	10:45:24	-145.2	-145.5	-145.1	-144.1	-143.1	-145.5
22	206	10:58:23	-145.0	-145.2	-144.7	-143.6	-142.8	-145.2
23	206	11:11:21	-144.7	-144.4	-144.3	-143.9	-142.9	-144.7
24	206	11:24:19	-144.3	-143.9	-144.0	-142.7	-141.8	-144.3
25	206	11:37:17	-143.2	-144.0	-143.6	-142.2	-141.2	-144.0
26	206	11:50:15	-143.5	-143.2	-143.0	-142.1	-141.2	-143.5
27	206	12: 3:14	-143.1	-143.5	-143.2	-142.0	-141.4	-143.5
28	206	12:16:12	-142.7	-143.0	-142.7	-142.2	-141.4	-143.0
29	206	12:29:10	-142.3	-142.4	-142.1	-141.3	-140.2	-142.4
30	206	12:42: 8	-141.5	-141.3	-141.3	-141.0	-140.2	-141.5
31	206	12:55: 7	-142.2	-142.2	-142.4	-141.6	-140.6	-142.4
32	206	13: 8: 5	-141.3	-140.9	-141.1	-140.5	-139.9	-141.3
33	206	13:21: 3	-141.2	-141.9	-141.3	-140.6	-139.7	-141.9
34	206	13:34: 1	-141.3	-141.3	-140.8	-140.6	-139.8	141.3
35	206	13:47: 0	-141.4	-141.1	-141.4	-140.9	-140.1	-141.4
36	206	13:59:58	-140.6	-140.4	-140.6	-140.2	-139.3	-140.6
37	206	14:12:56	-141.2	-140.9	-141.2	-141.1	-140.0	-141.2
38	206	14:25:54	-141.3	-141.4	-141.8	-141.3	-140.8	-141.8
39	206	14:38:53	-140.7	-140.8	-141.1	-140.3	-139.6	-141.1
40	206	14:51:51	-141.3	-139.8	-140.2	-139.8	-139.7	-141.3
41	206	15: 4:49	-140.6	-140.7	-140.6	-139.9	-139.2	-140.7
42	206	15:17:47	-140.4	-140.3	-140.2	-140.1	-139.5	-140.4
43	206	15:30:46	-141.0	-140.5	-140.6	-140.2	-139.6	-141.0
44	206	15:43:44	-141.1	-140.9	-141.1	-140.5	-140.3	-141.1
45	206	15:56:42	-140.4	-140.3	-140.4	-140.0	-139.4	-140.4
46	206	16: 9:40	-140.9	-141.2	-140.8	-141.0	-140.0	-141.2
47	206	16:22:39	-140.3	-140.5	-140.2	-139.8	-139.0	-140.5
48	206	16:35:37	-141.6	-141.0	-141.0	-140.6	-139.4	-141.6
49	206	16:48:35	-141.3	-141.1	-141.0	-140.6	-139.8	-141.3
50	206	17: 1:33	-141.4	-141.6	-141.0	-140.2	-139.8	-141.6
51	206	17:14:31	-141.5	-141.2	-141.4	-141.0	-139.8	-141.5
52	206	17:27:30	-141.1	-141.2	-141.4	-140.8	-140.0	-141.4
53	206	17:40:28	-141.3	-140.9	-141.0	-140.4	-139.8	-141.3
54	206	17:53:26	-141.0	-141.1	-141.3	-140.8	-139.6	-141.3
55	206	18: 6:24	-140.3	-141.0	-140.8	-140.4	-139.0	-141.0
56	206	18:19:23	-139.8	-139.5	-139.4	-139.0	-138.5	-139.8
57	206	18:32:21	-138.6	-139.1	-138.8	-138.7	-138.0	-139.1
58	206	18:45:19	-139.7	-139.4	[illegible]	[illegible]	[illegible]	[illegible]

Table 1

Individual 13 Minute Noise Samples
Effective Noise Level, Julian Day

12	206	8:48:40	-146.0	-146.2	-146.2	-145.3	-144.3	-146.2
13	206	9: 1:38	-145.6	-145.5	-145.2	-144.2	-143.3	-145.6
14	206	9:14:37	-145.3	-145.2	-144.9	-143.8	-142.9	-145.3
15	206	9:27:35	-144.6	-144.7	-144.8	-144.0	-143.1	-144.8
16	206	9:40:33	-145.3	-145.3	-145.0	-144.0	-143.2	-145.3
17	206	9:53:31	-145.3	-145.7	-145.3	-144.5	-143.6	-145.7
18	206	10: 6:30	-144.5	-145.0	-145.1	-144.3	-143.3	-145.1
19	206	10:19:28	-145.4	-145.3	-145.1	-144.3	-143.1	-145.4
20	206	10:32:26	-145.2	-145.2	-145.3	-144.3	-143.4	-145.3
21	206	10:45:24	-145.2	-145.5	-145.1	-144.1	-143.1	-145.5
22	206	10:58:23	-145.0	-145.2	-144.7	-143.6	-142.8	-145.2
23	206	11:11:21	-144.7	-144.4	-144.3	-143.9	-142.9	-144.7
24	206	11:24:19	-144.3	-143.9	-144.0	-142.7	-141.8	-144.3
25	206	11:37:17	-143.2	-144.0	-143.6	-142.2	-141.2	-144.0
26	206	11:50:15	-143.5	-143.2	-143.0	-142.1	-141.2	-143.5
27	206	12: 3:14	-143.1	-143.5	-143.2	-142.0	-141.4	-143.5
28	206	12:16:12	-142.7	-143.0	-142.7	-142.2	-141.4	-143.0
29	206	12:29:10	-142.3	-142.4	-142.1	-141.3	-140.2	-142.4
30	206	12:42: 8	-141.5	-141.3	-141.3	-141.0	-140.2	-141.5
31	206	12:55: 7	-142.2	-142.2	-142.4	-141.6	-140.6	-142.4
32	206	13: 8: 5	-141.3	-140.9	-141.1	-140.5	-139.9	-141.3
33	206	13:21: 3	-141.2	-141.9	-141.3	-140.6	-139.7	-141.9
34	206	13:34: 1	-141.3	-141.3	-140.8	-140.6	-139.8	-141.3
35	206	13:47: 0	-141.4	-141.1	-141.4	-140.9	-140.1	-141.4
36	206	13:59:58	-140.6	-140.4	-140.6	-140.2	-139.3	-140.6
37	206	14:12:56	-141.2	-140.9	-141.2	-141.1	-140.0	-141.[illegible]
38	206	14:25:54	-141.3	-141.4	-141.8	-141.3	-140.8	-141.[illegible]
39	206	14:38:53	-140.7	-140.8	-141.1	-140.3	-139.6	-141.1
40	206	14:51:51	-141.3	-139.8	-140.2	-139.8	-139.7	-141.3
41	206	15: 4:49	-140.6	-140.7	-140.6	-139.9	-139.2	-140.7
42	206	15:17:47	-140.4	-140.3	-140.2	-140.1	-139.5	-140.4
43	206	15:30:46	-141.0	-140.5	-140.6	-140.2	-139.6	-141.0
44	206	15:43:44	-141.1	-140.9	-141.1	-140.5	-140.3	-141.1
45	206	15:56:42	-140.4	-140.3	-140.4	-140.0	-139.4	-140.4
46	206	16: 9:40	-140.9	-141.2	-140.8	-141.0	-140.0	-141.2
47	206	16:22:39	-140.3	-140.5	-140.2	-139.8	-139.0	-140.5
48	206	16:35:37	-141.6	-141.0	-141.0	-140.6	-139.4	-141.6
49	206	16:48:35	-141.3	-141.1	-141.0	-140.6	-139.8	-141.3
50	206	17: 1:33	-141.4	-141.6	-141.0	-140.2	-139.8	-141.6
51	206	17:14:31	-141.5	-141.2	-141.4	-141.0	-139.8	-141.5
52	206	17:27:30	-141.1	-141.2	-141.4	-140.8	-140.0	-141.4
53	206	17:40:28	-141.3	-140.9	-141.0	-140.4	-139.8	-141.3
54	206	17:53:26	-141.0	-141.1	-141.3	-140.8	-139.6	-141.3
55	206	18: 6:24	-140.3	-141.0	-140.8	-140.4	-139.0	-141.0
56	206	18:19:23	-139.8	-139.5	-139.4	-139.0	-138.5	-139.8
57	206	18:32:21	-138.6	-139.1	-138.8	-138.7	-138.0	-139.1
58	206	18:45:19	-139.7	-139.4	-139.3	-138.9	-138.9	-139.7
59	206	18:58:17	-140.4	-140.3	-140.4	-140.3	-139.5	-140.4
60	206	19:11:16	-139.5	-140.4	-140.1	-139.6	-138.6	-140.4
61	206	19:24:14	-140.2	-140.5	-140.4	-140.0	-139.3	-140.5
62	206	19:37:12	-140.0	-139.8	-139.7	-139.3	-138.9	-140.0
63	206	19:50:10	-140.4	-140.5	-140.6	-140.1	-139.3	-140.6
64	206	20: 3: 9	-140.1	-140.4	-140.5	-139.8	-139.7	-140.5
65	206	20:16: 7	-140.6	-140.7	-140.8	-140.1	-139.4	-140.8
66	206	20:29: 5	-140.8	-139.9	-139.9	-139.8	-139.2	-140.8
67	206	20:42: 3	-140.0	-139.9	-139.8	-139.8	-139.2	-140.0
68	206	20:55: 2	-140.9	-141.2	-140.9	-140.2	-139.4	-141.2
69	206	21: 8: 0	-141.3	-141.2	-141.0	-140.5	-139.9	-141.3
70	206	21:20:58	-140.5	-140.4	-140.2	-139.6	-138.9	-140.5
71	206	21:33:56	-140.0	-140.3	-140.0	-139.7	-138.8	-140.3
72	206	21:46:55	-139.7	-139.3	-139.4	-139.2	-139.3	-139.7
73	206	21:59:53	-139.4	-139.1	-139.2	-138.9	-138.5	-139.4
DAILY MEAN			-142.5	-142.5	-142.4	-141.8	-141.0	-142.7
STANDARD DEV.			2.5	2.5	2.5	2.2	2.1	2.4

Effective Noise Level, Julian Day

NRL

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SAMPLE NUMBER	DAY NUMBER	UNIVERSAL TIME	EFFECTIVE NOISE LEVEL (DB RELATIVE TO 1A/m/√Hz) 1	2	3	4	5	MIN.
1	223	7:12:46	-144.7	-144.0	-144.4	-143.8	-142.3	-144.7
2	223	7:25:44	-144.1	-144.0	-143.6	-142.9	-141.8	-144.1
3	223	7:38:42	-143.6	-143.8	-143.7	-143.2	-141.9	-143.8
4	223	7:51:40	-144.2	-144.0	-144.0	-143.1	-141.9	-144.2
5	223	8: 4:38	-143.8	-144.1	-143.7	-142.8	-141.5	-144.1
6	223	8:17:37	-143.7	-143.4	-143.5	-142.5	-141.2	-143.7
7	223	8:30:35	-143.5	-143.4	-143.3	-142.8	-141.6	-143.5
8	223	8:43:33	-143.4	-143.1	-142.7	-141.8	-140.8	-143.4
9	223	8:56:31	-143.2	-142.4	-142.4	-141.8	-140.9	-143.2
10	223	9: 9:30	-143.4	-143.6	-143.6	-142.8	-141.5	-143.6
11	223	9:22:28	-143.0	-143.2	-143.2	-142.8	-141.4	-143.2
12	223	9:35:26	-142.8	-142.7	-142.7	-142.0	-140.6	-142.8
13	223	9:48:24	-142.5	-142.6	-142.4	-141.5	-140.6	-142.6
14	223	10: 1:23	-142.3	-142.2	-142.4	-141.5	-140.5	-142.4
15	223	10:14:21	-142.0	-142.1	-142.3	-141.9	-140.4	-142.3
16	223	10:27:19	-142.0	-141.8	-141.7	-140.9	-140.2	-142.0
17	223	10:40:17	-141.7	-141.8	-141.8	-141.2	-140.5	-141.8
18	223	10:53:16	-141.5	-141.4	-141.4	-140.9	-139.9	-141.5
19	223	11: 6:14	-140.5	-140.2	-140.2	-139.9	-138.8	-140.5
20	223	11:19:12	-140.6	-140.5	-140.7	-140.1	-139.0	-140.7
21	223	11:32:10	-139.9	-139.4	-139.7	-139.2	-138.6	-139.9
22	223	11:45: 9	-139.4	-139.2	-139.3	-139.0	-138.5	-139.4
23	223	11:58: 7	-139.2	-139.2	-138.9	-138.3	-138.0	-139.2
24	223	12:11: 5	-138.8	-138.7	-138.3	-137.8	-137.3	-138.8
25	223	12:24: 3	-139.0	-139.0	-139.0	-138.7	-138.0	-139.0
26	223	12:37: 1	-138.4	-138.1	-138.0	-137.9	-137.2	-138.4
27	223	12:50: 0	-137.8	-137.5	-137.6	-137.7	-137.0	-137.8
28	223	13: 2:58	-136.8	-136.1	-136.3	-136.5	-135.8	-136.8
29	223	13:15:56	-136.1	-135.9	-136.1	-136.4	-135.9	-136.4
30	223	13:28:54	-136.3	-136.4	-136.5	-136.2	-135.7	-136.5
31	223	13:41:53	-136.1	-136.2	-136.3	-136.1	-136.1	-136.3
32	223	13:54:51	-135.7	-135.9	-136.0	-135.8	-135.4	-136.0
33	223	14: 7:49	-134.3	-134.2	-134.1	-134.4	-134.1	-134.4
34	223	14:20:17	-135.3	-134.0	-134.3	-134.7	-134.5	-135.3
35	223	14:33:46	-135.4	-135.3	-135.3	-135.3	-134.8	-135.4
36	223	14:46:44	-134.8	-134.9	-135.1	-135.1	-134.7	-135.1
37	223	14:59:42	-133.7	-134.1	-134.2	-134.2	-134.3	-134.3
38	223	15:12:40	-133.7	-133.6	-133.7	-133.8	-133.2	-133.8
39	223	15:25:39	-134.7	-134.6	-134.8	-134.9	-134.0	-134.9
40	223	15:38:37	-135.4	-135.1	-135.4	-135.4	-135.1	-135.4
41	223	15:51:35	-133.7	-133.3	-133.7	-134.0	-133.9	-134.0
42	223	16: 4:33	-132.3	-131.9	-131.9	-132.2	-131.3	-132.3
43	223	16:17:32	-134.0	-133.0	-133.6	-133.6	-133.7	-134.0
44	223	16:30:30	-135.0	-134.2	-134.2	-134.3	-134.1	-135.0
45	223	16:43:28	-133.5	-133.4	-133.7	-133.8	-133.3	-133.8
46	223	16:56:26	-134.5	-134.0	-134.0	-134.6	-133.9	-134.6
47	223	17: 9:25	-135.9	-135.7	-135.6	-135.5	-135.0	-135.9
48	223	17:22:23	-136.0	-135.9	-136.5	-136.3	-136.0	-136.5
49	223	17:35:21	-135.7	-135.2	-135.4	-135.3	-134.3	-135.7
50	223	17:48:19	-133.8	-133.1	-133.6	-133.7	-133.6	-133.8
51	223	18: 1:17	-135.9	-135.5	-135.3	-135.6	-135.2	-135.9
52	223	18:14:16	-135.0	-134.4	-134.6	-134.6	-133.9	-135.0
53	223	18:27:14	-135.6	-135.6	-135.7	-136.0	-135.1	-136.0
54	223	18:40:12	-133.0	-132.4	-132.8	-133.1	-132.7	-133.1
55	223	18:53:10	-129.4	-128.9	-129.5	-130.1	-128.8	-130.1
56	223	19: 6: 9	-121.9	-120.8	-121.8	-122.6	-122.3	-122.6

Table 2

Individual 13 Minute Noise Samples For Five Clipper Settings And Minimum Effective Noise Level, Julian Day 223, 1975 (Noisy Day)

Table 2

Individual 13 Minute Noise Samples For Five Clipper Setti
Effective Noise Level, Julian Day 223, 1975 (Noisy Day)

SA	DA	UN	1	2	3	4	5	MIN.
1	223	7:12:46	-144.7	-144.0	-144.4	-143.8	-142.3	-144.7
2	223	7:25:44	-144.1	-144.0	-143.6	-142.9	-141.8	-144.1
3	223	7:38:42	-143.6	-143.8	-143.7	-143.2	-141.9	-143.8
4	223	7:51:40	-144.2	-144.0	-144.0	-143.1	-141.9	-144.2
5	223	8: 4:38	-143.8	-144.1	-143.7	-142.8	-141.5	-144.1
6	223	8:17:37	-143.7	-143.4	-143.5	-142.5	-141.2	-143.7
7	223	8:30:35	-143.5	-143.4	-143.3	-142.8	-141.6	-143.5
8	223	8:43:33	-143.4	-143.1	-142.7	-141.8	-140.8	-143.4
9	223	8:56:31	-143.2	-142.4	-142.4	-141.8	-140.9	-143.2
10	223	9: 9:30	-143.4	-143.6	-143.6	-142.8	-141.5	-143.6
11	223	9:22:28	-143.0	-143.2	-143.2	-142.8	-141.4	-143.2
12	223	9:35:26	-142.8	-142.7	-142.7	-142.0	-140.6	-142.8
13	223	9:48:24	-142.5	-142.6	-142.4	-141.5	-140.6	-142.6
14	223	10: 1:23	-142.3	-142.2	-142.4	-141.5	-140.5	-142.4
15	223	10:14:21	-142.0	-142.1	-142.3	-141.9	-140.4	-142.3
16	223	10:27:19	-142.0	-141.8	-141.7	-140.9	-140.2	-142.0
17	223	10:40:17	-141.7	-141.8	-141.8	-141.2	-140.5	-141.8
18	223	10:53:16	-141.5	-141.4	-141.4	-140.9	-139.9	-141.5
19	223	11: 6:14	-140.5	-140.2	-140.2	-139.9	-138.8	-140.5
20	223	11:19:12	-140.6	-140.5	-140.7	-140.1	-139.0	-140.7
21	223	11:32:10	-139.9	-139.4	-139.7	-139.2	-138.6	-139.9
22	223	11:45: 9	-139.4	-139.2	-139.3	-139.0	-138.5	-139.4
23	223	11:58: 7	-139.2	-139.2	-138.9	-138.3	-138.0	-139.2
24	223	12:11: 5	-138.8	-138.7	-138.3	-137.8	-137.3	-138.8
25	223	12:24: 3	-139.0	-139.0	-139.0	-138.7	-138.0	-139.0
26	223	12:37: 1	-138.4	-138.1	-138.0	-137.9	-137.2	-138.4
27	223	12:50: 0	-137.8	-137.5	-137.6	-137.7	-137.0	-137.8
28	223	13: 2:58	-136.8	-136.1	-136.3	-136.5	-135.8	-136.8
29	223	13:15:56	-136.1	-135.9	-136.1	-136.4	-135.9	-136.4
30	223	13:28:54	-136.3	-136.4	-136.5	-136.2	-135.7	-136.5
31	223	13:41:53	-136.1	-136.2	-136.3	-136.1	-136.1	-136.3
32	223	13:54:51	-135.7	-135.9	-136.0	-135.8	-135.4	-136.0
33	223	14: 7:49	-134.3	-134.2	-134.1	-134.4	-134.1	-134.4
34	223	14:20:47	-135.3	-134.0	-134.3	-134.7	-134.5	-135.3
35	223	14:33:46	-135.4	-135.3	-135.3	-135.3	-134.8	-135.4
36	223	14:46:44	-134.8	-134.9	-135.1	-135.1	-134.7	-135.1
37	223	14:59:42	-133.7	-134.1	-134.2	-134.2	-134.3	-134.3
38	223	15:12:40	-133.7	-133.6	-133.7	-133.8	-133.2	-133.8
39	223	15:25:39	-134.7	-134.6	-134.8	-134.9	-134.0	-134.9
40	223	15:38:37	-135.4	-135.1	-135.4	-135.4	-135.1	-135.4
41	223	15:51:35	-133.7	-133.3	-133.7	-134.0	-133.9	-134.0
42	223	16: 4:33	-132.3	-131.9	-131.9	-132.2	-131.3	-132.3
43	223	16:17:32	-134.0	-133.0	-133.6	-133.6	-133.7	-134.0
44	223	16:30:30	-135.0	-134.2	-134.2	-134.3	-134.1	-135.0
45	223	16:43:28	-133.5	-133.4	-133.7	-133.8	-133.3	-133.8
46	223	16:56:26	-134.5	-134.0	-134.0	-134.6	-133.9	-134.6
47	223	17: 9:25	-135.9	-135.7	-135.6	-135.5	-135.0	-135.9
48	223	17:22:23	-136.0	-135.9	-136.5	-136.3	-136.0	-136.5
49	223	17:35:21	-135.7	-135.2	-135.4	-135.3	-134.3	-135.7
50	223	17:48:19	-133.8	-133.1	-133.6	-133.7	-133.6	-133.8
51	223	18: 1:17	-135.9	-135.5	-135.3	-135.6	-135.2	-135.9
52	223	18:14:16	-135.0	-134.4	-134.6	-134.6	-133.9	-135.0
53	223	18:27:14	-135.6	-135.6	-135.7	-136.0	-135.1	-136.0
54	223	18:40:12	-133.0	-132.4	-132.8	-133.1	-132.7	-133.1
55	223	18:53:10	-129.4	-128.9	-129.5	-130.1	-128.8	-130.1
56	223	19: 6: 9	-121.9	-120.8	-121.8	-122.6	-122.3	-122.6
DAILY MEAN			-137.9	-137.7	-137.8	-137.6	-136.8	-138.0
STANDARD DEV.			4.5	4.6	4.5	4.1	3.8	4.4

NRL Mem Rept 3543

NRL - Code 5450

SAMPLE NUMBER	DAY NUMBER	UNIVERSAL TIME	EFFECTIVE NOISE LEVEL (DB RELATIVE TO 1A/m/$\sqrt{\text{Hz}}$) 1	2	3	4	5	MIN.
1	309	20: 5:22	-141.8	$\boxed{-143.1}$	$\boxed{-143.1}$	$\boxed{-143.1}$	-141.9	-143.1
2	309	20:18:22	-141.5	-142.3	-142.5	$\boxed{-142.6}$	-141.6	-142.6
3	309	20:31:21	-141.8	$\boxed{-141.9}$	-141.8	$\boxed{-141.9}$	-140.7	-141.9
4	309	20:44:20	-142.2	-142.8	$\boxed{-143.1}$	$\boxed{-143.1}$	-141.7	-143.1
5	309	20:57:20	-142.2	-142.6	-142.8	$\boxed{-143.1}$	-141.8	-143.1
6	309	21:10:19	-142.2	-142.3	-142.4	$\boxed{-142.6}$	-141.2	-142.6
7	309	21:23:18	-141.9	-142.3	-142.5	$\boxed{-142.6}$	-141.5	-142.6
8	309	21:36:18	-141.1	-141.4	$\boxed{-141.5}$	-141.4	-139.9	-141.5
9	309	21:49:17	-141.6	-142.4	-142.6	$\boxed{-142.7}$	-141.0	-142.7
10	309	22: 2:17	-141.8	-142.4	-142.5	$\boxed{-142.6}$	-141.0	-142.6
11	309	22:15:16	-142.5	-142.6	$\boxed{-143.1}$	-142.6	-141.3	-143.1
12	309	22:28:16	-141.4	-142.0	-141.9	$\boxed{-142.1}$	-140.0	-142.1
13	309	22:41:15	$\boxed{-142.2}$	-142.0	-142.1	-141.8	-140.3	-142.2
14	309	22:54:14	-141.0	-141.7	$\boxed{-141.8}$	-141.5	-140.3	-141.8
15	309	23: 7:14	-141.9	-142.6	$\boxed{-142.8}$	-142.7	-140.7	-142.8
16	309	23:20:13	-142.4	-142.5	$\boxed{-142.8}$	-142.5	-141.3	-142.8
17	309	23:33:13	-141.8	$\boxed{-142.6}$	-142.4	-141.8	-140.6	-142.6
18	309	23:46:12	-142.2	-142.2	-142.2	$\boxed{-142.8}$	-141.0	-142.8
19	309	23:59:11	-142.8	-142.7	-143.1	$\boxed{-143.2}$	-142.1	-143.2
20	310	0:12:11	-142.8	-143.1	$\boxed{-143.2}$	-143.0	-141.7	-143.2
21	310	0:25:10	-143.0	-143.3	-143.4	$\boxed{-143.5}$	-141.9	-143.5
22	310	0:38:10	-143.8	-143.6	-143.7	$\boxed{-143.8}$	-142.5	-143.8
23	310	0:51: 9	-144.7	-144.9	$\boxed{-145.1}$	-145.0	-143.3	-145.1
24	310	1: 4: 9	-143.5	-144.1	$\boxed{-144.3}$	-143.5	-142.4	-144.3
25	310	1:17: 8	-143.4	-143.8	$\boxed{-143.9}$	-143.3	-141.9	-143.9
26	310	1:30: 7	-144.2	$\boxed{-144.7}$	$\boxed{-144.7}$	-144.2	-143.0	-144.7
27	310	1:43: 7	-143.7	-144.0	$\boxed{-144.5}$	-144.2	-142.4	-144.5
28	310	1:56: 6	-144.1	-143.8	$\boxed{-144.2}$	-143.8	-142.8	-144.2
29	310	2: 9: 6	-144.6	-144.8	-145.1	$\boxed{-145.4}$	-144.1	-145.4
30	310	2:22: 5	-145.1	-145.2	$\boxed{-145.3}$	-145.0	-143.8	-145.3
31	310	2:35: 5	-144.2	-145.0	$\boxed{-145.1}$	-144.7	-143.1	-145.1
32	310	2:48: 4	$\boxed{-144.9}$	-144.3	-144.8	-144.5	-143.2	-144.9
33	310	3: 1: 4	-145.3	-145.5	$\boxed{-145.6}$	-145.1	-143.4	-145.6
34	310	3:14: 3	-145.2	-145.6	$\boxed{-145.8}$	-145.3	-143.8	-145.8
35	310	3:27: 3	-146.3	$\boxed{-146.8}$	-146.7	-146.1	-144.4	-146.8
36	310	3:40: 2	-146.5	-146.6	$\boxed{-147.0}$	-145.7	-144.2	-147.0
37	310	3:53: 1	-145.6	-145.9	$\boxed{-146.0}$	-145.3	-144.0	-146.0
38	310	4: 6: 1	-146.5	$\boxed{-146.9}$	$\boxed{-146.9}$	-145.8	-144.4	-146.9
39	310	4:19: 0	-147.0	-147.0	$\boxed{-147.5}$	-145.9	-144.1	-147.5
40	310	4:32: 0	-148.3	$\boxed{-148.3}$	$\boxed{-148.3}$	-146.6	-145.0	-148.3
41	310	4:44:59	-147.2	-147.7	$\boxed{-147.8}$	-146.4	-144.9	-147.8
42	310	4:57:59	-146.3	-146.0	$\boxed{-146.5}$	-145.5	-144.0	-146.5
43	310	5:10:58	-145.4	-145.8	$\boxed{-146.0}$	-145.1	-143.3	-146.0
44	310	5:23:58	-146.2	-146.1	$\boxed{-146.4}$	-145.4	-143.7	-146.4
45	310	5:36:58	-146.5	-146.5	$\boxed{-147.0}$	-146.3	-144.5	-147.0
46	310	5:49:57	$\boxed{-146.4}$	-146.3	$\boxed{-146.3}$	-145.7	-144.1	-146.4
47	310	6: 2:57	-146.0	-145.8	$\boxed{-146.1}$	-145.3	-144.1	-146.1
48	310	6:15:56	-146.5	-146.9	$\boxed{-147.3}$	-146.1	-144.7	-147.3

Table 3

Individual 13 Minute Noise Samples For Five Clipper Settings And Minimum Effective Noise Level, Julian Days 309 And 310, 1975 (Noisy Day)

Table 3 Individual 13 Minute Noise Samples Effective Noise Level, Julian Days

9	309	21:49:17	-141.6	-142.4	-142.6	-142.7	-141.0	-142.7
10	309	22: 2:17	-141.8	-142.4	-142.5	-142.6	-141.0	-142.6
11	309	22:15:16	-142.5	-142.6	-143.1	-142.6	-141.3	-143.1
12	309	22:28:16	-141.4	-142.0	-141.9	-142.1	-140.0	-142.1
13	309	22:41:15	-142.2	-142.0	-142.1	-141.8	-140.3	-142.2
14	309	22:54:14	-141.0	-141.7	-141.8	-141.5	-140.3	-141.8
15	309	23: 7:14	-141.9	-142.6	-142.8	-142.7	-140.7	-142.8
16	309	23:20:13	-142.4	-142.5	-142.8	-142.5	-141.3	-142.8
17	309	23:33:13	-141.8	-142.6	-142.4	-141.8	-140.6	-142.6
18	309	23:46:12	-142.2	-142.2	-142.2	-142.8	-141.0	-142.8
19	309	23:59:11	-142.8	-142.7	-143.1	-143.2	-142.1	-143.2
20	310	0:12:11	-142.8	-143.1	-143.2	-143.0	-141.7	-143.2
21	310	0:25:10	-143.0	-143.3	-143.4	-143.5	-141.9	-143.5
22	310	0:38:10	-143.8	-143.6	-143.7	-143.8	-142.5	-143.8
23	310	0:51: 9	-144.7	-144.9	-145.1	-145.0	-143.3	-145.1
24	310	1: 4: 9	-143.5	-144.1	-144.3	-143.5	-142.4	-144.3
25	310	1:17: 8	-143.4	-143.8	-143.9	-143.3	-141.9	-143.9
26	310	1:30: 7	-144.2	-144.7	-144.7	-144.2	-143.0	-144.7
27	310	1:43: 7	-143.7	-144.0	-144.5	-144.2	-142.4	-144.5
28	310	1:56: 6	-144.1	-143.8	-144.2	-143.8	-142.8	-144.2
29	310	2: 9: 6	-144.6	-144.8	-145.1	-145.4	-144.1	-145.4
30	310	2:22: 5	-145.1	-145.2	-145.3	-145.0	-143.8	-145.3
31	310	2:35: 5	-144.2	-145.0	-145.1	-144.7	-143.1	-145.1
32	310	2:48: 4	-144.9	-144.3	-144.8	-144.5	-143.2	-144.9
33	310	3: 1: 4	-145.3	-145.5	-145.6	-145.1	-143.4	-145.6
34	310	3:14: 3	-145.2	-145.6	-145.8	-145.3	-143.8	-145.8
35	310	3:27: 3	-146.3	-146.8	-146.7	-146.1	-144.4	-146.8
36	310	3:40: 2	-146.5	-146.6	-147.0	-145.7	-144.2	-147.0
37	310	3:53: 1	-145.6	-145.9	-146.0	-145.3	-144.0	-146.0
38	310	4: 6: 1	-146.5	-146.9	-146.9	-145.8	-144.4	-146.9
39	310	4:19: 0	-147.0	-147.0	-147.5	-145.9	-144.1	-147.5
40	310	4:32: 0	-148.3	-148.3	-148.3	-146.6	-145.0	-148.3
41	310	4:44:59	-147.2	-147.7	-147.8	-146.4	-144.9	-147.8
42	310	4:57:59	-146.3	-146.0	-146.5	-145.5	-144.0	-146.5
43	310	5:10:58	-145.4	-145.8	-146.0	-145.1	-143.3	-146.0
44	310	5:23:58	-146.2	-146.1	-146.4	-145.4	-143.7	-146.4
45	310	5:36:58	-146.5	-146.5	-147.0	-146.3	-144.5	-147.0
46	310	5:49:57	-146.4	-146.3	-146.3	-145.7	-144.1	-146.4
47	310	6: 2:57	-146.0	-145.8	-146.1	-145.3	-144.1	-146.1
48	310	6:15:56	-146.5	-146.9	-147.3	-146.1	-144.7	-147.3
49	310	6:28:56	-147.4	-147.4	-147.9	-146.5	-144.9	-147.9
50	310	6:41:55	-146.6	-146.7	-146.6	-145.9	-144.5	-146.7
51	310	6:54:55	-146.1	-146.4	-146.9	-146.1	-144.6	-146.9
52	310	7: 7:54	-145.9	-146.9	-146.9	-145.7	-144.2	-146.9
53	310	7:20:54	-147.2	-147.6	-148.0	-146.9	-145.7	-148.0
54	310	7:33:53	-147.0	-147.1	-147.8	-146.5	-145.4	-147.8
55	310	7:46:53	-147.5	-147.2	-147.7	-146.7	-145.1	-147.7
56	310	7:59:52	-146.9	-147.4	-147.6	-146.6	-145.1	-147.6
57	310	8:12:52	-147.4	-147.6	-148.1	-146.7	-144.7	-148.1
58	310	8:25:52	-147.4	-148.1	-148.6	-147.3	-145.8	-148.6
59	310	8:38:51	-147.9	-148.7	-148.8	-147.5	-145.7	-148.8
60	310	8:51:51	-147.7	-148.9	-149.4	-147.6	-146.0	-149.4
61	310	9: 4:50	-148.2	-149.3	-149.9	-148.0	-146.1	-149.9
62	310	9:17:50	-148.7	-148.4	-150.8	-148.3	-146.1	-150.8
63	310	9:30:49	-148.5	-148.1	-149.3	-147.9	-145.8	-149.3
64	310	9:43:49	-148.4	-148.3	-148.2	-147.8	-146.1	-148.4
65	310	9:56:49	-148.0	-147.6	-147.6	-147.5	-145.7	-148.0
66	310	10: 9:48	-146.8	-146.6	-146.8	-146.8	-145.0	-146.8
67	310	10:22:48	-146.6	-146.3	-146.5	-146.3	-144.5	-146.6
68	310	10:35:47	-145.8	-145.8	-146.0	-145.7	-144.6	-146.0
69	310	10:48:47	-145.6	-145.6	-145.5	-145.3	-143.7	-145.6
70	310	11: 1:47	-145.0	-144.6	-144.7	-145.0	-143.7	-145.0
DAILY MEAN			-144.9	-145.2	-145.4	-144.9	-143.4	-145.5
STANDARD DEV.			2.3	2.2	2.3	1.8	1.8	2.3

NRL Memo Rept 3543

NRL Code 5458 – J. [illegible]

SAMPLE NUMBER	DAY NUMBER	UNIVERSAL TIME	EFFECTIVE NOISE LEVEL (DB RELATIVE TO 1A/m/$\sqrt{Hz}$) 1	2	3	4	5	MIN.
1	328	21:20: 5	-146.7	-146.5	-146.4	-146.2	-144.1	-146.7
2	328	21:33: 5	-146.4	-147.0	-146.8	-146.6	-144.3	-147.0
3	328	21:46: 5	-147.8	-147.9	-147.7	-147.2	-145.2	-147.9
4	328	21:59: 5	-147.5	-148.0	-148.0	-147.6	-145.3	-148.0
5	328	22:12: 4	-147.7	-148.6	-148.6	-148.4	-146.2	-148.6
6	328	22:25: 4	-147.9	-148.8	-148.7	-148.6	-146.1	-148.8
7	328	22:38: 4	-148.8	-149.4	-149.2	-148.6	-146.3	-149.4
8	328	22:51: 4	-149.3	-150.6	-149.8	-149.1	-147.4	-150.6
9	328	23: 4: 3	-149.6	-151.0	-150.4	-150.0	-147.4	-151.0
10	328	23:17: 3	-149.7	-151.3	-150.4	-149.7	-147.5	-151.3
11	328	23:30: 3	-150.7	-153.2	-151.7	-150.5	-148.1	-153.2
12	328	23:43: 2	-150.0	-148.9	-151.3	-150.6	-148.3	-151.3
13	328	23:56: 2	-150.0	-149.8	-150.6	-150.0	-147.5	-150.6
14	329	0: 9: 2	-150.1	-150.2	-150.5	-150.2	-147.7	-150.5
15	329	0:22: 2	-150.4	-150.6	-151.1	-150.8	-148.7	-151.1
16	329	0:35: 1	-150.9	-151.0	-151.3	-150.8	-148.3	-151.3
17	329	0:48: 1	-150.2	-150.4	-150.6	-150.3	-148.0	-150.6
18	329	1: 1: 1	-150.7	-150.9	-152.0	-151.3	-148.8	-152.0
19	329	1:14: 0	-150.2	-150.6	-150.7	-150.2	-147.8	-150.7
20	329	1:27: 0	-150.0	-149.8	-150.4	-150.1	-147.6	-150.4
21	329	1:40: 0	-149.9	-150.1	-150.6	-150.5	-148.4	-150.6
22	329	1:53: 0	-149.9	-150.0	-150.8	-150.7	-148.2	-150.8
23	329	2: 5:59	-150.5	-150.6	-151.1	-151.1	-148.7	-151.1
24	329	2:18:59	-150.7	-150.8	-151.4	-151.3	-149.2	-151.4
25	329	2:31:59	-150.6	-150.6	-151.0	-151.0	-148.8	-151.0
26	329	2:44:59	-149.4	-149.6	-150.4	-150.6	-148.2	-150.6
27	329	2:57:58	-150.0	-150.3	-150.6	-150.3	-148.0	-150.6
28	329	3:10:58	-150.0	-150.3	-150.8	-150.9	-148.6	-150.9
29	329	3:23:58	-150.3	-150.6	-151.0	-150.7	-148.7	-151.0
30	329	3:36:58	-150.4	-150.9	-151.6	-151.5	-149.6	-151.6
31	329	3:49:57	-149.8	-149.7	-150.5	-151.1	-149.0	-151.1
32	329	4: 2:57	-150.4	-151.0	-151.5	-151.3	-149.4	-151.5
33	329	4:15:57	-151.0	-151.0	-151.5	-151.2	-149.8	-151.5
34	329	4:28:57	-150.5	-150.5	-151.0	-151.2	-149.2	-151.2
35	329	4:41:56	-150.4	-150.5	-150.9	-151.1	-149.4	-151.1
36	329	4:54:56	-151.4	-151.2	-151.8	-151.7	-149.9	-151.8
37	329	5: 7:56	-151.2	-151.4	-151.6	-152.0	-150.1	-152.0
38	329	5:20:56	-150.9	-151.4	-151.4	-150.9	-149.0	-151.4
39	329	5:33:55	-150.8	-150.9	-151.4	-151.4	-149.7	-151.4
40	329	5:46:55	-150.8	-151.5	-151.9	-151.7	-149.6	-151.9
41	329	5:59:55	-150.6	-150.4	-150.9	-150.9	-148.6	-150.9
42	329	6:12:55	-150.6	-150.3	-150.6	-150.4	-148.6	-150.6
43	329	6:25:54	-149.8	-150.2	-150.6	-150.5	-148.1	-150.6
44	329	6:38:54	-149.6	-149.7	-150.1	-150.1	-148.1	-150.1
45	329	6:51:54	-149.3	-149.4	-149.9	-150.1	-148.4	-150.1
46	329	7: 4:54	-149.5	-149.7	-150.0	-149.8	-148.3	-150.0
47	329	7:17:53	-149.3	-149.5	-149.9	-150.1	-148.2	-150.1
48	329	7:30:53	-150.1	-150.4	-150.8	-150.6	-148.9	-150.8
49	329	7:43:53	-150.2	-150.2	-150.4	-150.2	-148.6	-150.4
50	329	7:56:53	-150.5	-150.1	-150.6	-150.9	-149.1	-150.9
51	329	8: 9:53	-150.6	-150.1	-150.7	-150.9	-149.2	-150.9

Table 4

Individual 13 Minute Noise Samples For Five Clipper Settings And Minimum Effective Noise Level, Julian Days 328 And 329, 1975 (Quiet Day)

Table 4

Individual 13 Minute Noise Sampl

Effective Noise Level, Julian Da

NRL Code 5458

11	328	23:30: 3	-150.7	-153.2	-151.7	-150.5	-148.1	-153.2
12	328	23:43: 2	-150.0	-148.9	-151.3	-150.6	-148.3	-151.3
13	328	23:56: 2	-150.0	-149.8	-150.6	-150.0	-147.5	-150.6
14	329	0: 9: 2	-150.1	-150.2	-150.5	-150.2	-147.7	-150.5
15	329	0:22: 2	-150.4	-150.6	-151.1	-150.8	-148.7	-151.1
16	329	0:35: 1	-150.9	-151.0	-151.3	-150.8	-148.3	-151.3
17	329	0:48: 1	-150.2	-150.4	-150.6	-150.3	-148.0	-150.6
18	329	1: 1: 1	-150.7	-150.9	-152.0	-151.3	-148.8	-152.0
19	329	1:14: 0	-150.2	-150.6	-150.7	-150.2	-147.8	-150.7
20	329	1:27: 0	-150.0	-149.8	-150.4	-150.1	-147.6	-150.4
21	329	1:40: 0	-149.9	-150.1	-150.6	-150.5	-148.4	-150.6
22	329	1:53: 0	-149.9	-150.0	-150.8	-150.7	-148.2	-150.8
23	329	2: 5:59	-150.5	-150.6	-151.1	-151.1	-148.7	-151.1
24	329	2:18:59	-150.7	-150.8	-151.4	-151.3	-149.2	-151.4
25	329	2:31:59	-150.6	-150.6	-151.0	-151.0	-148.8	-151.0
26	329	2:44:59	-149.4	-149.6	-150.4	-150.6	-148.2	-150.6
27	329	2:57:58	-150.0	-150.3	-150.6	-150.3	-148.0	-150.6
28	329	3:10:58	-150.0	-150.3	-150.8	-150.9	-148.6	-150.9
29	329	3:23:58	-150.3	-150.6	-151.0	-150.7	-148.7	-151.0
30	329	3:36:58	-150.4	-150.9	-151.6	-151.5	-149.6	-151.6
31	329	3:49:57	-149.8	-149.7	-150.5	-151.1	-149.0	-151.1
32	329	4: 2:57	-150.4	-151.0	-151.5	-151.3	-149.4	-151.5
33	329	4:15:57	-151.0	-151.0	-151.5	-151.2	-149.8	-151.5
34	329	4:28:57	-150.5	-150.5	-151.0	-151.2	-149.2	-151.2
35	329	4:41:56	-150.4	-150.5	-150.9	-151.1	-149.4	-151.1
36	329	4:54:56	-151.4	-151.2	-151.8	-151.7	-149.9	-151.8
37	329	5: 7:56	-151.2	-151.4	-151.6	-152.0	-150.1	-152.0
38	329	5:20:56	-150.9	-151.4	-151.4	-150.9	-149.0	-151.4
39	329	5:33:55	-150.8	-150.9	-151.4	-151.4	-149.7	-151.4
40	329	5:46:55	-150.8	-151.5	-151.9	-151.7	-149.6	-151.9
41	329	5:59:55	-150.6	-150.4	-150.9	-150.9	-148.6	-150.9
42	329	6:12:55	-150.6	-150.3	-150.6	-150.4	-148.6	-150.6
43	329	6:25:54	-149.8	-150.2	-150.6	-150.5	-148.1	-150.6
44	329	6:38:54	-149.6	-149.7	-150.1	-150.1	-148.1	-150.1
45	329	6:51:54	-149.3	-149.4	-149.9	-150.1	-148.4	-150.1
46	329	7: 4:54	-149.5	-149.7	-150.0	-149.8	-148.3	-150.0
47	329	7:17:53	-149.3	-149.5	-149.9	-150.1	-148.2	-150.1
48	329	7:30:53	-150.1	-150.4	-150.8	-150.6	-148.9	-150.8
49	329	7:43:53	-150.2	-150.2	-150.4	-150.2	-148.6	-150.4
50	329	7:56:53	-150.5	-150.1	-150.6	-150.9	-149.1	-150.9
51	329	8: 9:53	-150.6	-150.1	-150.7	-150.9	-149.2	-150.9
52	329	8:22:52	-150.9	-151.5	-152.1	-152.0	-149.8	-152.1
53	329	8:35:52	-151.3	-151.6	-152.2	-152.0	-149.8	-152.2
54	329	8:48:52	-151.5	-151.6	-152.1	-151.7	-149.6	-152.1
55	329	9: 1:52	-151.2	-151.9	-152.2	-152.0	-149.7	-152.2
56	329	9:14:52	-151.1	-151.0	-151.6	-151.5	-149.9	-151.6
57	329	9:27:51	-150.7	-150.8	-151.0	-151.0	-148.9	-151.0
58	329	9:40:51	-151.0	-151.0	-151.3	-151.0	-149.2	-151.3
59	329	9:53:51	-149.6	-149.8	-150.4	-150.2	-148.5	-150.4
60	329	10: 6:51	-150.1	-150.4	-150.6	-150.5	-148.7	-150.6
61	329	10:19:51	-149.8	-149.6	-149.9	-150.1	-148.4	-150.1
62	329	10:32:51	-149.1	-149.5	-149.7	-149.9	-148.1	-149.9
63	329	10:45:51	-149.1	-148.8	-149.4	-149.5	-147.6	-149.5
64	329	10:58:50	-149.2	-149.2	-149.8	-149.9	-148.1	-149.9
65	329	11:11:50	-148.8	-148.7	-149.1	-149.3	-147.8	-149.3
66	329	11:24:50	-149.1	-149.3	-149.7	-149.8	-147.9	-149.8
67	329	11:37:50	-148.7	-148.6	-148.9	-148.7	-147.1	-148.9
68	329	11:50:50	-147.9	-148.3	-148.5	-148.2	-146.3	-148.5
69	329	12: 3:50	-147.3	-147.4	-147.6	-147.6	-146.0	-147.6
DAILY MEAN			-149.9	-150.1	-150.4	-150.3	-148.2	-150.5
STANDARD DEV.			1.1	1.2	1.2	1.2	1.3	1.2

2

NRL Memo Rept 3543

NRL - Code 5458 J. Heletine

SAMPLE NUMBER	DAY NUMBER	UNIVERSAL TIME	EFFECTIVE NOISE LEVEL (DB RELATIVE TO 1A/m/$\sqrt{Hz}$)					
			1	2	3	4	5	MIN.
1	86	20:16: 3	-149.1	-148.5	-149.0	-148.3	-145.8	-149.1
2	86	20:29: 2	-147.9	-148.1	-148.5	-147.6	-145.9	-148.5
3	86	20:42: 2	-148.2	-148.6	-149.2	-148.1	-145.7	-149.2
4	86	20:55: 1	-147.3	-147.0	-148.0	-147.1	-144.9	-148.0
5	86	21: 8: 0	-147.6	-147.7	-148.3	-148.0	-145.8	-148.3
6	86	21:20:59	-147.6	-147.0	-146.8	-147.1	-145.1	-147.6
7	86	21:33:58	-148.3	-148.2	-148.1	-147.9	-145.8	-148.3
8	86	21:46:57	-147.4	-148.1	-148.0	-148.0	-145.6	-148.1
9	86	21:59:56	-148.5	-148.3	-148.5	-148.6	-146.5	-148.6
10	86	22:12:55	-148.1	-148.2	-148.4	-148.2	-146.2	-148.4
11	86	22:25:54	-149.0	-149.2	-149.4	-149.7	-147.1	-149.7
12	86	22:38:53	-148.9	-149.1	-148.9	-148.8	-146.8	-149.1
13	86	22:51:52	-148.6	-148.3	-148.7	-148.7	-146.7	-148.7
14	86	23: 4:51	-148.1	-148.1	-148.2	-148.2	-146.3	-148.2
15	86	23:17:50	-149.0	-149.0	-149.3	-149.5	-147.0	-149.5
16	86	23:30:49	-148.8	-148.4	-148.2	-148.7	-146.3	-148.8
17	86	23:43:49	-147.7	-147.2	-147.5	-148.1	-146.0	-148.1
18	86	23:56:48	-147.0	-147.8	-147.7	-148.2	-145.8	-148.2
19	87	0: 9:47	-146.7	-146.3	-146.4	-147.0	-145.3	-147.0
20	87	0:22:46	-146.7	-146.9	-147.0	-147.5	-145.6	-147.5
21	87	0:35:45	-147.0	-147.2	-147.1	-147.5	-145.3	-147.5
22	87	0:48:44	-146.1	-146.0	-146.0	-146.1	-144.4	-146.1
23	87	1: 1:43	-145.6	-145.4	-145.8	-146.2	-144.6	-146.2
24	87	1:14:43	-145.4	-145.7	-145.6	-146.1	-144.0	-146.1
25	87	1:27:42	-145.0	-145.0	-145.2	-145.5	-143.4	-145.5
26	87	1:40:41	-145.7	-145.7	-145.6	-146.4	-144.0	-146.4
27	87	1:53:40	-145.0	-144.1	-144.5	-145.0	-143.3	-145.0
28	87	2: 6:39	-145.3	-145.1	-145.5	-146.1	-144.1	-146.1
29	87	2:19:38	-145.6	-145.6	-145.8	-146.2	-144.2	-146.2
30	87	2:32:38	-145.5	-145.9	-145.9	-145.9	-144.2	-145.9
31	87	2:45:37	-146.4	-146.0	-145.8	-146.0	-143.9	-146.4
32	87	2:58:36	-146.1	-146.2	-145.8	-146.2	-143.8	-146.2
33	87	3:11:35	-146.4	-146.4	-146.7	-146.7	-144.6	-146.7
34	87	3:24:34	-146.2	-146.6	-146.4	-146.7	-144.0	-146.7
35	87	3:37:34	-147.2	-147.0	-147.1	-147.0	-144.8	-147.2
36	87	3:50:33	-147.9	-147.7	-147.9	-147.7	-145.6	-147.9
37	87	4: 3:32	-147.0	-147.0	-146.9	-147.2	-144.8	-147.2
38	87	4:16:31	-148.0	-147.8	-147.7	-147.8	-145.4	-148.0
39	87	4:29:31	-147.7	-147.8	-147.9	-147.3	-144.7	-147.9
40	87	4:42:30	-147.6	-147.7	-147.7	-147.7	-145.2	-147.7
41	87	4:55:29	-148.9	-148.7	-148.3	-148.1	-145.6	-148.9
42	87	5: 8:28	-148.6	-148.5	-148.7	-148.4	-145.5	-148.7
43	87	5:21:28	-149.3	-149.1	-149.1	-149.1	-146.6	-149.3
44	87	5:34:27	-149.0	-149.0	-148.5	-148.6	-146.0	-149.0
45	87	5:47:26	-149.3	-149.4	-149.7	-149.3	-146.5	-149.7
46	87	6: 0:25	-149.8	-149.4	-149.0	-148.7	-146.3	-149.8
47	87	6:13:25	-151.1	-150.6	-150.6	-150.2	-147.9	-151.1
48	87	6:26:24	-150.4	-150.5	-150.4	-150.2	-147.2	-150.5
49	87	6:39:23	-151.8	-151.0	-150.9	-150.2	-147.4	-151.8
50	87	6:52:23	-151.1	-150.7	-150.4	-150.3	-147.7	-151.1
51	87	7: 5:22	-150.6	-150.6	-150.2	-150.0	-147.6	-150.6

Table 5

Individual 13 Minute Noise Samples For Five Clipper Settings And Minimum Effective Noise Level, Julian Days 86 And 87, 1976 (Quiet Day)

Table
Individual 13 Minute Noise Samp
Effective Noise Level, Julian D

10	86	22:12:55	-148.1	-148.2	-148.4	-148.2	-146.2	-148.4
11	86	22:25:54	-149.0	-149.2	-149.4	-149.7	-147.1	-149.7
12	86	22:38:53	-148.9	-149.1	-148.9	-148.8	-146.8	-149.1
13	86	22:51:52	-148.6	-148.3	-148.7	-148.7	-146.7	-148.7
14	86	23: 4:51	-148.1	-148.1	-148.2	-148.2	-146.3	-148.2
15	86	23:17:50	-149.0	-149.0	-149.3	-149.5	-147.0	-149.5
16	86	23:30:49	-148.8	-148.4	-148.2	-148.7	-146.3	-148.8
17	86	23:43:49	-147.7	-147.2	-147.5	-148.1	-146.0	-148.1
18	86	23:56:48	-147.0	-147.8	-147.7	-148.2	-145.8	-148.2
19	87	0: 9:47	-146.7	-146.3	-146.4	-147.0	-145.3	-147.0
20	87	0:22:46	-146.7	-146.9	-147.0	-147.5	-145.6	-147.5
21	87	0:35:45	-147.0	-147.2	-147.1	-147.5	-145.3	-147.5
22	87	0:48:44	-146.1	-146.0	-146.0	-146.1	-144.4	-146.1
23	87	1: 1:43	-145.6	-145.4	-145.8	-146.2	-144.6	-146.2
24	87	1:14:43	-145.4	-145.7	-145.6	-146.1	-144.0	-146.1
25	87	1:27:42	-145.0	-145.0	-145.2	-145.5	-143.4	-145.5
26	87	1:40:41	-145.7	-145.7	-145.6	-146.4	-144.0	-146.4
27	87	1:53:40	-145.0	-144.1	-144.5	-145.0	-143.3	-145.0
28	87	2: 6:39	-145.3	-145.1	-145.5	-146.1	-144.1	-146.1
29	87	2:19:38	-145.6	-145.6	-145.8	-146.2	-144.2	-146.2
30	87	2:32:38	-145.5	-145.9	-145.9	-145.9	-144.2	-145.9
31	87	2:45:37	-146.4	-146.0	-145.8	-146.0	-143.9	-146.4
32	87	2:58:36	-146.1	-146.2	-145.8	-146.2	-143.8	-146.2
33	87	3:11:35	-146.4	-146.4	-146.7	-146.7	-144.6	-146.7
34	87	3:24:34	-146.2	-146.6	-146.4	-146.7	-144.0	-146.7
35	87	3:37:34	-147.2	-147.0	-147.1	-147.0	-144.8	-147.2
36	87	3:50:33	-147.9	-147.7	-147.9	-147.7	-145.6	-147.9
37	87	4: 3:32	-147.0	-147.0	-146.9	-147.2	-144.8	-147.2
38	87	4:16:31	-148.0	-147.8	-147.7	-147.8	-145.4	-148.0
39	87	4:29:31	-147.7	-147.8	-147.9	-147.3	-144.7	-147.9
40	87	4:42:30	-147.6	-147.7	-147.7	-147.7	-145.2	-147.7
41	87	4:55:29	-148.9	-148.7	-148.3	-148.1	-145.6	-148.9
42	87	5: 8:28	-148.6	-148.5	-148.7	-148.4	-145.5	-148.7
43	87	5:21:28	-149.3	-149.1	-149.1	-149.1	-146.6	-149.3
44	87	5:34:27	-149.0	-149.0	-148.6	-148.6	-146.0	-149.0
45	87	5:47:26	-149.3	-149.4	-149.7	-149.3	-146.5	-149.7
46	87	6: 0:25	-149.8	-149.4	-149.0	-148.7	-146.3	-149.8
47	87	6:13:25	-151.1	-150.6	-150.6	-150.2	-147.9	-151.1
48	87	6:26:24	-150.4	-150.5	-150.4	-150.2	-147.2	-150.5
49	87	6:39:23	-151.8	-151.0	-150.9	-150.2	-147.4	-151.8
50	87	6:52:23	-151.1	-150.7	-150.4	-150.3	-147.7	-151.1
51	87	7: 5:22	-150.6	-150.6	-150.2	-150.0	-147.6	-150.6
52	87	7:18:41	-150.7	-150.3	-150.4	-150.1	-147.9	-150.7
53	87	7:31:40	-150.1	-149.9	-150.2	-150.4	-148.5	-150.4
54	87	7:44:40	-150.6	-151.1	-151.2	-151.4	-149.1	-151.4
55	87	7:57:39	-152.0	-151.9	-151.5	-151.4	-149.3	-152.0
56	87	8:10:38	-152.1	-151.8	-151.5	-151.3	-149.2	-152.1
57	87	8:23:38	-150.6	-151.1	-151.0	-150.9	-148.3	-151.1
58	87	8:36:37	-149.7	-150.5	-150.1	-150.0	-147.7	-150.5
59	87	8:49:36	-150.5	-150.4	-150.2	-149.8	-147.6	-150.5
60	87	9: 2:36	-151.5	-151.5	-151.4	-151.2	-149.0	-151.5
61	87	9:15:35	-150.9	-151.2	-151.1	-151.0	-148.3	-151.2
62	87	9:28:35	-149.6	-150.2	-149.9	-149.9	-147.6	-150.2
63	87	9:41:34	-149.5	-149.7	-149.8	-149.6	-146.8	-149.8
64	87	9:54:33	-148.5	-149.0	-149.1	-149.2	-146.9	-149.2
65	87	10: 7:33	-148.5	-149.0	-149.1	-149.5	-147.0	-149.5
66	87	10:20:32	-147.8	-148.1	-148.2	-148.6	-146.2	-148.6
67	87	10:33:32	-147.5	-147.7	-148.2	-148.2	-145.7	-148.2
68	87	10:46:31	-146.6	-146.5	-146.6	-146.9	-145.2	-146.9
DAILY MEAN			-148.3	-148.3	-148.3	-148.3	-146.1	-148.6
STANDARD DEV.			1.8	1.8	1.8	1.6	1.5	1.7

NRL Memo Rept 3543

NRL - Ltr 5458

SAMPLE NUMBER	DAY NUMBER	UNIVERSAL TIME	EFFECTIVE NOISE LEVEL (DB RELATIVE TO 1A/m/$\sqrt{\text{Hz}}$) 1	2	3	4	5	MIN.
1	106	20:11:15	-139.7	-139.7	-140.2	-140.8	-139.8	-140.8
2	106	20:24:15	-139.3	-139.6	-140.1	-140.4	-138.9	-140.4
3	106	20:37:14	-139.8	-140.2	-140.2	-140.2	-139.1	-140.2
4	106	20:50:14	-139.9	-140.8	-140.5	-140.7	-139.2	-140.8
5	106	21: 3:14	-140.0	-140.9	-140.5	-140.6	-139.7	-140.9
6	106	21:16:13	-139.3	-140.4	-140.4	-140.3	-139.2	-140.4
7	106	21:29:13	-140.3	-140.9	-140.4	-140.8	-139.4	-140.9
8	106	21:42:12	-141.2	-141.4	-141.5	-141.4	-140.1	-141.5
9	106	21:55:12	-140.9	-141.1	-141.2	-141.0	-140.1	-141.2
10	106	22: 8:12	-140.7	-142.1	-141.7	-141.2	-139.9	-142.1
11	106	22:21:11	-142.2	-142.6	-142.4	-142.5	-140.9	-142.6
12	106	22:34:11	-142.1	-142.8	-142.3	-142.3	-141.0	-142.8
13	106	22:47:10	-141.4	-141.6	-141.4	-141.6	-140.3	-141.6
14	106	23: 0:10	-140.7	-141.5	-141.3	-141.3	-139.5	-141.5
15	106	23:13: 9	-141.4	-141.9	-141.8	-142.0	-140.7	-142.0
16	106	23:26: 9	-141.3	-142.2	-141.9	-141.9	-140.2	-142.2
17	106	23:39: 8	-141.6	-142.4	-142.4	-142.1	-140.6	-142.4
18	106	23:52: 8	-141.8	-142.4	-142.3	-142.2	-140.6	-142.4
19	107	0: 5: 8	-141.5	-141.7	-141.2	-141.4	-140.1	-141.7
20	107	0:18: 7	-141.6	-142.7	-142.3	-142.3	-140.7	-142.7
21	107	0:31: 7	-141.8	-142.3	-141.9	-141.6	-140.3	-142.3
22	107	0:44: 6	-141.8	-143.1	-142.7	-142.5	-140.9	-143.1
23	107	0:57: 6	-142.2	-142.8	-142.1	-141.8	-140.5	-142.8
24	107	1:10: 5	-142.5	-143.4	-142.9	-142.5	-141.2	-143.4
25	107	1:23: 5	-142.6	-143.3	-143.0	-142.5	-141.0	-143.3
26	107	1:36: 5	-142.9	-143.6	-143.0	-142.9	-141.4	-143.6
27	107	1:49: 4	-141.8	-142.7	-142.9	-142.7	-141.0	-142.9
28	107	2: 2: 4	-141.9	-141.9	-141.8	-141.8	-140.6	-141.9
29	107	2:15: 3	-140.2	-141.7	-141.5	-141.3	-139.8	-141.7
30	107	2:28: 3	-141.0	-141.7	-141.3	-141.3	-140.6	-141.7
31	107	2:41: 2	-141.4	-142.0	-141.9	-141.9	-140.2	-142.0
32	107	2:54: 2	-141.8	-142.8	-142.4	-142.3	-141.0	-142.8
33	107	3: 7: 2	-141.8	-142.7	-142.6	-142.6	-140.8	-142.7
34	107	3:20: 1	-142.2	-143.4	-143.0	-143.2	-141.4	-143.4
35	107	3:33: 1	-143.7	-144.3	-143.9	-143.9	-142.6	-144.3
36	107	3:46: 0	-144.7	-145.5	-144.8	-144.7	-143.1	-145.5
37	107	3:59: 0	-146.2	-147.4	-146.4	-145.8	-144.2	-147.4
38	107	4:11:59	-145.7	-146.9	-146.4	-145.8	-144.2	-146.9
39	107	4:24:59	-145.7	-145.8	-145.5	-145.6	-143.8	-145.8
40	107	4:37:59	-145.3	-144.6	-145.1	-144.4	-142.9	-145.3
41	107	4:50:58	-144.3	-144.4	-144.5	-144.0	-142.7	-144.5
42	107	5: 3:58	-143.3	-143.2	-143.6	-143.2	-141.7	-143.6
43	107	5:16:5	-142.1	-142.3	-142.4	-142.2	-140.5	-142.4
44	107	5:29:57	-143.1	-143.0	-143.1	-142.6	-141.6	-143.1
45	107	5:42:56	-142.9	-143.4	-143.5	-143.0	-141.9	-143.5
46	107	5:55:56	-143.4	-143.4	-143.6	-143.3	-141.5	-143.6
47	107	6: 8:56	-143.7	-144.1	-144.1	-143.7	-142.0	-144.1
48	107	6:21:55	-144.4	-144.1	-144.3	-143.8	-142.2	-144.4

Table 6

Individual 13 Minute Noise Samples For Five Clipper Settings And Minimum Effective Noise Level, Julian Days 106 And 107, 1976 (Noisy Day)

Tabl[e] Individual 13 Minute Noise Sample[s] Effective Noise Level, Julian Day[s]

9	106	21:55:12	-140.9	-141.1	-141.2	-141.0	-140.1	-141.2
10	106	22: 8:12	-140.7	-142.1	-141.7	-141.2	-139.9	-142.1
11	106	22:21:11	-142.2	-142.6	-142.4	-142.5	-140.9	-142.6
12	106	22:34:11	-142.1	-142.8	-142.3	-142.3	-141.0	-142.8
13	106	22:47:10	-141.4	-141.6	-141.4	-141.6	-140.3	-141.6
14	106	23: 0:10	-140.7	-141.5	-141.3	-141.3	-139.5	-141.5
15	106	23:13: 9	-141.4	-141.9	-141.8	-142.0	-140.7	-142.0
16	106	23:26: 9	-141.3	-142.2	-141.9	-141.9	-140.2	-142.2
17	106	23:39: 8	-141.6	-142.4	-142.4	-142.1	-140.6	-142.4
18	106	23:52: 8	-141.8	-142.4	-142.3	-142.2	-140.6	-142.4
19	107	0: 5: 8	-141.5	-141.7	-141.2	-141.4	-140.1	-141.7
20	107	0:18: 7	-141.6	-142.7	-142.3	-142.3	-140.7	-142.7
21	107	0:31: 7	-141.8	-142.3	-141.9	-141.6	-140.3	-142.3
22	107	0:44: 6	-141.8	-143.1	-142.7	-142.5	-140.9	-143.1
23	107	0:57: 6	-142.2	-142.8	-142.1	-141.8	-140.5	-142.8
24	107	1:10: 5	-142.5	-143.4	-142.9	-142.5	-141.2	-143.4
25	107	1:23: 5	-142.6	-143.3	-143.0	-142.5	-141.0	-143.3
26	107	1:36: 5	-142.9	-143.6	-143.0	-142.9	-141.4	-143.6
27	107	1:49: 4	-141.8	-142.7	-142.9	-142.7	-141.0	-142.9
28	107	2: 2: 4	-141.9	-141.9	-141.8	-141.8	-140.6	-141.9
29	107	2:15: 3	-140.2	-141.7	-141.5	-141.3	-139.8	-141.7
30	107	2:28: 3	-141.0	-141.7	-141.3	-141.3	-140.6	-141.7
31	107	2:41: 2	-141.4	-142.0	-141.9	-141.9	-140.2	-142.0
32	107	2:54: 2	-141.8	-142.8	-142.4	-142.3	-141.0	-142.8
33	107	3: 7: 2	-141.8	-142.7	-142.6	-142.6	-140.8	-142.7
34	107	3:20: 1	-142.2	-143.4	-143.0	-143.2	-141.4	-143.4
35	107	3:33: 1	-143.7	-144.3	-143.9	-143.9	-142.6	-144.3
36	107	3:46: 0	-144.7	-145.5	-144.8	-144.7	-143.1	-145.5
37	107	3:59: 0	-146.2	-147.4	-146.4	-145.8	-144.2	-147.4
38	107	4:11:59	-145.7	-146.9	-146.4	-145.8	-144.2	-146.9
39	107	4:24:59	-145.7	-145.8	-145.5	-145.6	-143.8	-145.8
40	107	4:37:59	-145.3	-144.6	-145.1	-144.4	-142.9	-145.3
41	107	4:50:58	-144.3	-144.4	-144.5	-144.0	-142.7	-144.5
42	107	5: 3:58	-143.3	-143.2	-143.6	-143.2	-141.7	-143.6
43	107	5:16:57	-142.1	-142.3	-142.4	-142.2	-140.5	-142.4
44	107	5:29:57	-143.1	-143.0	-143.1	-142.6	-141.6	-143.1
45	107	5:42:56	-142.9	-143.4	-143.5	-143.0	-141.9	-143.5
46	107	5:55:56	-143.4	-143.4	-143.6	-143.3	-141.5	-143.6
47	107	6: 8:56	-143.7	-144.1	-144.1	-143.7	-142.0	-144.1
48	107	6:21:55	-144.4	-144.1	-144.3	-143.8	-142.2	-144.4
49	107	6:34:55	-143.8	-144.0	-144.6	-144.1	-142.4	-144.6
50	107	6:47:54	-144.9	-144.6	-144.8	-144.3	-142.7	-144.9
51	107	7: 0:54	-144.4	-144.7	-145.2	-144.8	-142.9	-145.2
52	107	7:13:53	-144.9	-144.7	-145.1	-144.2	-142.8	-145.1
53	107	7:26:53	-144.8	-144.8	-144.8	-144.3	-142.5	-144.8
54	107	7:39:53	-144.3	-144.6	-145.0	-144.5	-142.6	-145.0
55	107	7:52:52	-144.7	-144.7	-145.3	-144.8	-143.0	-145.3
56	107	8: 5:52	-145.2	-145.2	-145.5	-144.7	-142.9	-145.5
57	107	8:18:51	-146.4	-146.3	-146.2	-145.5	-143.7	-146.4
58	107	8:31:51	-146.5	-146.3	-146.1	-145.5	-143.5	-146.5
59	107	8:44:50	-146.8	-146.7	-146.5	-145.1	-143.8	-146.8
60	107	8:57:50	-146.2	-145.7	-146.1	-145.3	-143.7	-146.2
61	107	9:10:50	-145.0	-144.9	-144.7	-143.9	-142.3	-145.0
62	107	9:23:49	-144.0	-144.0	-144.2	-143.8	-142.1	-144.2
63	107	9:36:49	-144.5	-144.1	-144.1	-143.3	-141.8	-144.5
64	107	9:49:48	-143.4	-144.6	-144.9	-143.9	-142.2	-144.9
65	107	10: 2:48	-144.2	-144.1	-144.4	-143.7	-142.2	-144.4
66	107	10:15:47	-143.9	-144.2	-144.1	-144.0	-142.7	-144.2
67	107	10:28:47	-142.9	-142.6	-143.3	-142.9	-141.3	-143.3
68	107	10:41:46	-142.7	-143.1	-143.3	-142.8	-141.0	-143.3
DAILY MEAN			-142.9	-143.3	-143.2	-142.9	-141.4	-143.4
STANDARD DEV.			1.9	1.7	1.8	1.5	1.4	1.7

Table 7
Comparison of the noisy and quiet days for the summer, fall and spring seasons of the measured daily minimum mean effective noise in Italy and Norway

	ITALY		NORWAY	
SEASON	QUIET DAY	NOISY DAY	QUIET DAY	NOISY DAY
SUMMER	-142.7	-138.0	-144.8	-138.3
FALL	-150.5	-145.5	-152.3	-147.0
SPRING	-148.6	-143.4	-150.2 -151.9	-146.4 -145.5